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TUBERCULOSIS
IN CANADA

C. J. WHERRETT

1964



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ROYAL COMMISSION ON HEALTH SERVICES

TUBERCULOSIS IN CANADA

G.J. Wherrett, M.D.

Publication of this study by the Royal Commission on Health Services does not necessarily involve acceptance by the Commissioners of all the statements and opinions therein contained.

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ACKNOWLEDGEMENTS

This study was undertaken in 1961 under the supervision of the Director of Research for the Royal Commission on Health Services. It outlines the progress made in the control of tuberculosis in Canada and the present position of the disease as a public health problem. The success of the campaign has brought about many changes in services now in operation and more will be required in the future. This report suggests further changes that will be necessary to keep tuberculosis under control.

In making this study a great deal of information has been obtained from many departments and individuals. The Dominion Bureau of Statistics has provided information on mortality and morbidity and particularly the problem of institutional treatment of tuberculosis.

The Department of National Health and Welfare, particularly the Indian and Northern Health Services, and the National Health Grant personnel have provided much useful data. The Division of Epidemiology kindly prepared the graphs used in this study.

The provincial health departments have given valuable information and advice. The tuberculosis and health authorities of Holland, Denmark and Norway gave me information and extended great courtesy during a visit to these countries in March 1962.

Professor Bernard Blishen and Dr. Robert Kohn have given direction and advice throughout, and Mrs. H.M. Roney and her staff, by their typing and secretarial services, have made the study possible. For these and other courtesies I am most grateful.

Ottawa 1964.

G.J. Wherrett, M.D.

INTRODUCTION

The purpose of this report is to set out the problem of tuberculosis in Canada, the progress already made in its control, the special problems remaining, the services which exist and the changes needed to eradicate the disease as a public health problem.

This report includes a number of tables and graphs. These demonstrate the great reduction (90 per cent) in deaths and death rates in the past 20 years. The rate of decline has been accentuated since the introduction of new drugs in 1949. The reduction in new cases is not so spectacular but nevertheless considerable.

The problem of reactivation is examined and the need for special supervision of the ex-patient emphasized. Beginning with 1961, reactivations have been reported to the Dominion Bureau of Statistics as well as new cases. Reports on reactivations from all provinces except Quebec have been received. Information on all cases on the case register has also been received from four provinces and some figures for the prevalence of tuberculosis are given as well as the clinical status of all cases on the register. Based on this information some estimates for Canada are submitted.

An outline of the scope of tuberculosis services is given with some indication as to the future development of those services considering the problems still to be overcome.

The cost of institutional care is surveyed and the possibility of integrating tuberculosis services into medical services generally is discussed. A comparison is made of the costs of sanatorium treatment with those of general hospitals. This is of some importance if tuberculosis is to be included in hospital insurance plans.

Attention has been given to the Indian and Eskimo problems and the advisability of integration of services related to those in the provinces.

The use of tuberculosis control grants is discussed with the suggestion that they be determined entirely on a population basis and that they be used for community rather than institutional services.

The use of the BCG vaccine is discussed and also the necessity for further research in the field of tuberculosis with the object of improving the vaccine and developing better drugs.

CHAPTER 1

TUBERCULOSIS MORTALITY AND MORBIDITY

Few advances in medicine during the last quarter century have been more dramatic or more widely publicized than the decline in tuberculosis mortality and morbidity in the western world. Canada is among the countries where the decline is most striking. This is shown in Table 3 and Figures 2 and 3.

CHARACTERISTICS OF THE DECLINE IN MORTALITY AND MORBIDITY FROM TUBERCULOSIS

The decline as set out is not uniform since mortality and morbidity are influenced by a number of factors. Among these are the following:

Age

While a reduction in death rates has taken place in all age groups, the rates are still high in middle and old ages as shown in Figures 5 and 6.

Sex

The sex specific rates, fairly comparable up to the age group 30-39, are much lower for females in the subsequent age groups than for males. Rates among middle aged and older men remain stubbornly high.

Occupation

Study of occupation groups indicates that unskilled labourers, and individuals in the fishing, logging and mining industries, are those with the highest incidence rates.

Race and Ethnic Origin

Statistically, race plays an important part. Incidence and death rates in the northern areas particularly in the Northwest Territories are from ten to fifteen times higher than the rates in southern areas. This is due to the large Indian and Eskimo population in northern areas. The Indian and Eskimo rate

TABLE 1
OCCUPATION OF TUBERCULOUS FIRST ADMISSIONS,
RATE PER 100,000 POPULATION¹

Occupation	Rate
Fishing, trapping and logging	157
Mining, quarrying and oil wells.....	146
Labourers	126
Service	54
Manufacturing and mechanical.....	47
Transportation	45
Professional	32
Clerical.....	30
Agricultural	26
Communication.....	23
Managerial	23
Construction	21
Commercial	16
Financial	11

¹Based on arithmetic means of 1961 monthly Labour Force Surveys, Dominion Bureau of Statistics.

TABLE 2
ACTIVE TUBERCULOSIS, ONTARIO 1961,
RATE BY COUNTRY OF BIRTH¹

	Number Cases of Active TB	Per cent of Cases	Population ²	Percentage Contribution of Group to Population	Rate per 100,000
Canadian born (excluding Indians)....	953 ³	55.9	4,834,861	77.5	19.7
Foreign born ..	633 ³	37.2	1,353,157	21.7	46.8
Indians	117	6.9	48,074	0.8	243.4
Totals	1,703	100.0	6,236,092	100.0	27.3

¹Ontario Department of Health, *The Epidemiology and Management of Tuberculosis in Ontario*, 1961. Toronto: Queen's Printer.

²Based on 1961 Canadian Census.

³Includes a proportional distribution of 261 white cases whose country of birth was not known.

for 1961 is 20.9 as compared to 4.2 for the other races. Definite rates are not available for other ethnic groups in Canada. A comparison of rates for all foreign born and Indians as compared to other Canadian born is shown in Table 2. Tuberculin testing in Ontario shows a marked difference in incidence in Canadian born, foreign born, and Indians as shown in Figure 1 and Table 3. A comparison of the rate per 100,000 for active tuberculosis in Ontario sets out the extent to which foreign born and Indians exceed the rate for the

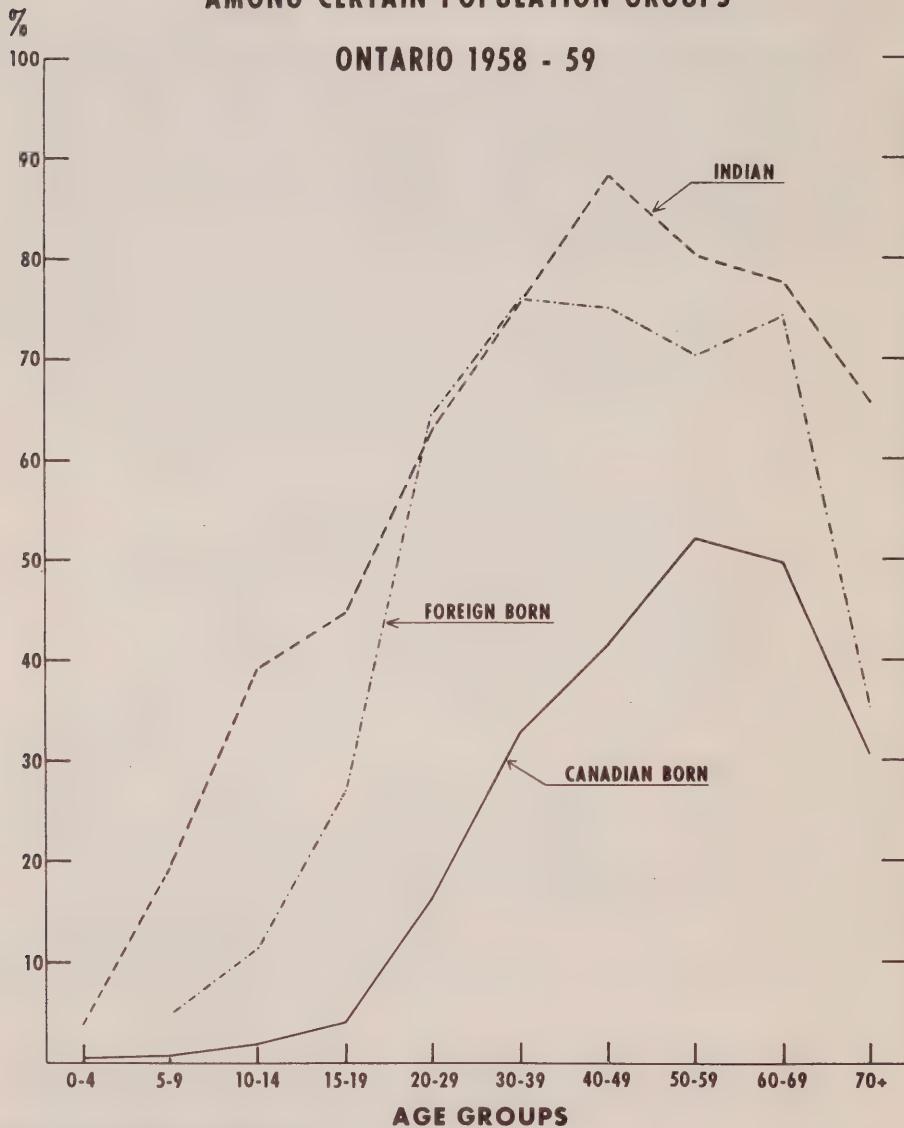
Canadian born excluding Indians. This is shown in Table 2. The ethnic origin of the population must be taken into consideration in planning clinics, and case-finding surveys have been organized for this purpose.

Special Foci of Infection

It has been mentioned that older men, certain occupational groups such as loggers, fishermen, and unskilled labourers constitute a great source of infection. Case-finding services must be focused on these areas. Alcoholics are a particular problem as a source of infection. They are unsettled and inclined to take treatment poorly. Special studies are necessary for the care and management of the alcoholic to determine the extent of the problem and to reduce the source of infection in the community.

Fig. 1

TUBERCULOUS INFECTION RATES AMONG CERTAIN POPULATION GROUPS



PREPARED BY THE EPIDEMIOLOGY DIVISION, DEPT. N. H. & W.

TABLE 3
INFECTION RATES BY AGE GROUPS, ONTARIO,
1958 - 1959

Age Group	MALE			FEMALE			TOTAL		
	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive
Total tested									
0-4	6,287	36	.6	5,867	29	.5	12,154	65	.5
5-9	11,041	113	1.0	10,994	135	1.2	22,035	248	1.1
10-14	10,709	286	2.7	10,716	276	2.6	21,425	562	2.6
15-19	7,201	354	4.9	8,971	429	4.8	16,172	783	4.8
20-29	8,175	1,306	15.9	8,344	1,093	13.1	16,519	2,399	14.5
30-39	8,181	3,010	36.8	10,346	2,810	27.2	18,527	5,820	31.4
40-49	6,953	3,174	45.5	8,094	2,522	31.2	15,047	5,696	37.9
50-59	4,567	2,335	51.1	5,316	1,918	36.1	9,883	4,253	43.0
60-69	2,673	1,405	32.6	3,194	1,151	36.0	5,867	2,556	43.6
70 and over.....	1,643	640	38.9	1,823	536	29.4	3,466	1,176	33.9
Not stated.....	282	67	23.8	310	58	18.7	592	125	21.1
	67,712	12,726	18.8	73,975	10,957	14.8	141,687	23,683	16.7

TABLE 3 (Cont'd)

Age Group	MALE			FEMALE			TOTAL		
	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive
<i>Foreign born</i>									
0-4.....	146	4	2.7	164	—	—	310	4	1.3
5-9.....	407	12	2.9	380	17	4.5	787	29	3.7
10-14.....	798	71	8.9	736	52	7.1	1,534	123	8.0
15-19.....	626	95	15.2	646	96	14.9	1,272	191	15.0
20-29.....	1,157	495	42.8	939	325	34.6	2,096	820	39.1
30-39.....	1,463	942	64.4	1,933	1,013	52.4	3,396	1,555	57.6
40-49.....	1,220	812	66.6	1,251	643	51.4	2,471	1,455	58.9
50-59.....	1,176	766	65.1	1,124	557	49.6	2,300	1,323	57.5
60-69.....	640	406	63.4	689	317	46.0	1,329	723	54.4
70 and over	489	243	49.7	420	155	36.9	909	398	43.8
Not stated	23	12	52.2	24	7	29.2	47	19	40.4
	8,145	3,858	47.4	8,306	3,182	38.3	16,451	7,040	42.7

TUBERCULOSIS MORTALITY AND MORBIDITY

<i>Canadian born</i>									
0-4.....	5,969	30	0.5	5,525	18	.3	11,494	48	.4
5-9.....	10,493	77	.7	10,450	88	.8	20,943	165	.8
10-14.....	9,788	170	1.7	9,844	182	1.8	19,632	352	1.8
15-19.....	6,526	239	3.7	8,249	304	3.7	14,775	543	3.7
20-29.....	6,962	780	11.2	7,308	716	9.8	14,270	1,496	10.5
30-39.....	6,663	2,022	30.3	8,311	1,727	20.8	14,974	3,749	25.0
40-49.....	5,688	2,326	40.9	6,769	1,815	26.8	12,457	4,141	33.2
50-59.....	3,341	1,526	45.7	4,139	1,322	31.9	7,480	2,848	38.1
60-69.....	1,997	967	48.9	2,470	'810	32.8	4,467	1,777	39.8
70 and over.....	1,141	388	34.0	1,382	369	26.7	2,523	757	30.0
Not stated.....	248	45	18.1	276	44	15.9	524	89	16.9
	58,816	8,570	14.6	64,723	7,395	11.4	123,539	15,965	12.9

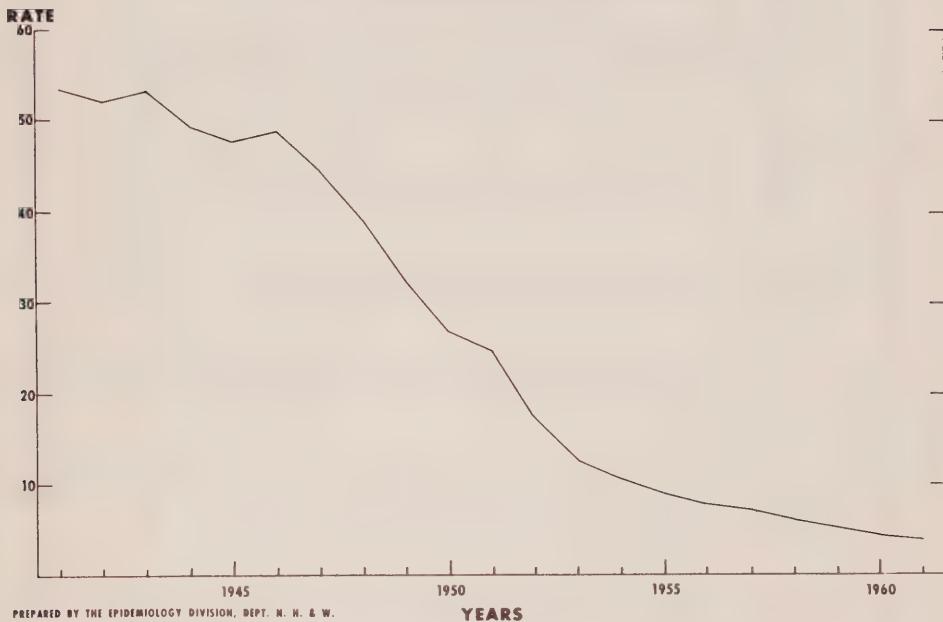
TABLE 3 (Concl'd)

Age Group	MALE			FEMALE			TOTAL		
	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive
<i>Indians</i>									
0-4.....	172	2	1.2	178	11	6.2	350	13	3.7
5-9.....	141	24	17.0	164	30	18.3	305	54	17.7
10-14.....	123	45	36.6	136	42	30.9	259	87	33.6
15-19.....	49	20	40.8	76	29	38.2	125	49	39.2
20-29.....	56	31	55.4	97	52	53.6	153	83	54.2
30-39.....	55	46	83.6	102	70	68.6	157	116	73.9
40-49.....	45	36	80.0	74	64	86.5	119	100	84.0
50-59.....	50	43	86.0	53	39	73.6	103	82	79.6
60-69.....	36	32	88.9	35	24	68.6	71	56	78.9
70 and over.....	13	9	69.2	21	12	57.1	34	21	61.8
Not stated	11	10	90.9	10	7	70.0	21	17	80.9
	751	298	39.7	946	380	40.2	1,697	678	39.9

Source: Ontario Department of Health, *The Epidemiology of Tuberculosis in Ontario, 1961*. Toronto: Queen's Printer.

DEATHS FROM ALL FORMS OF TUBERCULOSIS
RATE PER 100,000 POPULATION
CANADA 1941-1961

Fig. 2



PREPARED BY THE EPIDEMIOLOGY DIVISION, DEPT. N. H. & W.

TABLE 4
DEATHS FROM ALL FORMS OF TUBERCULOSIS, CANADA AND PROVINCES, 1937-1962,
NUMBER

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
1937	6,728	-	65	461	388	2,769	1,315	426	303	340	602	12	47
1938	6,172	-	81	415	342	2,616	1,237	349	271	280	535	17	29
1939	6,044	-	63	428	286	2,680	1,085	367	233	283	552	18	49
1940	5,845	-	56	415	295	2,503	1,011	369	241	321	578	4	52
1941	6,157	-	70	429	314	2,685	1,106	328	284	329	533	11	74
1942	6,061	-	43	379	330	2,719	1,093	336	251	271	558	18	63
1943	6,263	-	42	417	225	2,842	1,101	384	250	294	613	14	81
1944	5,853	-	58	357	238	2,624	1,068	348	223	291	517	27	102
1945	5,694	-	42	338	266	2,555	1,015	315	227	263	525	21	127
1946	5,941	-	55	382	277	2,628	1,054	324	223	302	576	19	101
1947	5,571	-	63	309	261	2,436	1,042	308	231	263	536	18	110
1948	4,887	-	37	247	230	2,216	825	288	229	259	442	13	101
1949	4,382	285	22	184	195	1,897	686	224	185	211	406	16	71
1950	3,679	247	29	176	159	1,571	585	179	153	171	313	15	81
1951	3,481	256	17	126	134	1,553	579	158	156	146	292	9	55
1952	2,538	175	24	94	100	1,108	398	115	104	125	214	5	76
1953	1,861	111	13	72	69	844	311	89	87	68	146	5	46
1954	1,593	105	10	76	51	714	307	71	42	63	123	2	29
1955	1,403	82	6	48	43	608	242	72	57	81	143	3	18
1956	1,256	82	4	44	45	572	221	61	46	43	110	-	28
1957	1,183	82	11	45	32	513	221	70	31	68	86	1	23
1958	1,027	64	5	36	35	504	186	42	23	44	70	-	18
1959	959	54	4	28	44	485	166	41	27	44	54	1	11
1960	823	41	3	33	20	389	157	39	34	34	63	1	9
1961	769	34	6	28	32	366	137	39	25	32	59	1	10
1962	785	47	3	28	25	362	164	34	30	48	-	-	14

TUBERCULOSIS MORTALITY AND MORBIDITY

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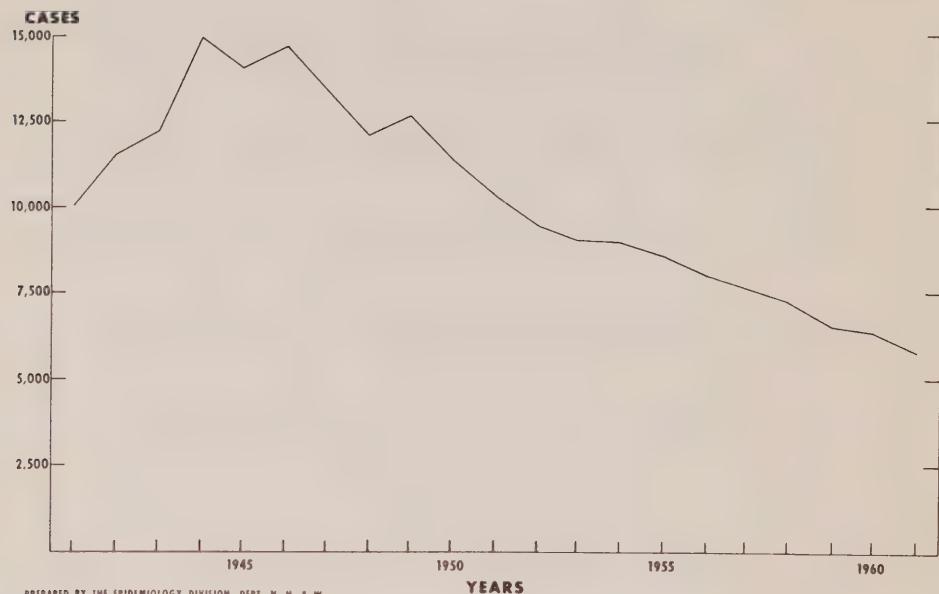
TABLE 4 (Concl'd)
DEATHS FROM ALL FORMS OF TUBERCULOSIS, CANADA AND PROVINCES, 1937-1962,
RATE PER 100,000 POPULATION

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	North-west Territories
1937	60.9	-	69.9	84.0	88.8	88.2	36.2	59.6	32.9	43.8	79.3	240.0	427.3
1938	55.3	-	86.2	74.8	77.4	82.2	33.7	48.5	29.6	35.9	69.0	340.0	263.6
1939	53.6	-	67.0	76.3	64.0	83.0	29.3	50.6	25.7	36.0	69.7	360.0	408.3
1940	51.4	-	58.9	72.9	65.3	76.4	27.0	50.7	26.8	40.6	71.8	80.0	433.3
1941	53.5	-	73.7	74.2	68.6	80.6	29.0	44.9	31.7	41.3	65.2	220.0	616.7
1942	52.0	-	47.8	64.1	71.1	80.2	28.1	46.4	29.6	34.9	64.1	360.0	525.0
1943	53.1	-	46.2	68.8	48.6	82.2	28.1	53.1	29.8	37.5	68.1	280.0	675.0
1944	49.0	-	63.7	58.4	51.6	75.0	26.9	47.9	26.7	36.0	55.5	540.0	850.0
1945	47.2	-	45.7	54.6	57.0	71.8	25.4	43.3	27.3	32.5	55.3	420.0	1,058.3
1946	48.3	-	58.5	62.8	57.9	72.4	25.8	44.6	26.8	37.6	57.4	237.5	631.3
1947	44.4	-	67.0	50.2	53.5	65.7	25.0	41.7	27.6	31.9	51.3	225.0	687.5
1948	38.1	-	39.8	39.5	46.2	58.5	19.3	38.6	27.3	30.3	40.9	162.5	631.3
1949	32.6	82.6	23.4	29.3	38.4	48.9	15.7	29.6	22.2	23.8	36.5	200.0	443.8
1950	26.8	70.4	30.2	27.6	31.1	39.6	13.1	23.3	18.4	18.7	27.5	187.5	506.3
1951	24.8	70.8	17.3	19.6	26.0	38.3	12.6	20.3	18.8	15.5	23.1	100.0	343.8
1952	17.6	46.8	24.0	14.4	19.0	26.5	8.3	14.4	12.3	12.8	17.8	55.6	475.0
1953	12.5	29.0	12.9	10.9	12.9	19.8	6.3	11.0	10.1	6.7	11.7	55.6	287.5
1954	10.4	26.6	9.9	11.3	9.4	16.3	6.0	8.6	4.8	6.0	9.5	20.0	170.6
1955	8.9	20.2	6.0	7.0	7.9	13.5	4.6	8.6	6.5	7.4	10.7	27.3	100.0
1956	7.8	19.8	4.0	6.3	8.1	12.4	4.1	7.2	5.2	3.8	7.9	-	145.1
1957	7.1	19.2	11.1	6.4	5.7	10.8	3.9	8.1	3.5	5.9	5.8	8.3	121.1
1958	6.0	14.6	5.0	5.1	6.1	10.3	3.2	4.8	2.6	3.7	4.5	-	90.0
1959	5.5	12.0	3.9	3.9	7.5	9.7	2.8	4.6	3.0	3.5	3.4	7.7	52.4
1960	4.6	8.9	2.9	4.6	3.3	7.6	2.6	4.3	3.7	2.7	3.9	7.1	40.9
1961	4.2	7.4	5.7	3.8	5.4	7.0	2.2	4.2	2.7	3.6	2.4	6.8	43.5
1962	4.2	10.0	2.8	3.8	4.1	6.7	2.6	3.6	3.2	2.2	2.9	-	58.3

Source: Compiled by Dominion Bureau of Statistics for the Royal Commission on Health Services.

NOTIFICATIONS REPORTED
CANADA 1941 - 1961

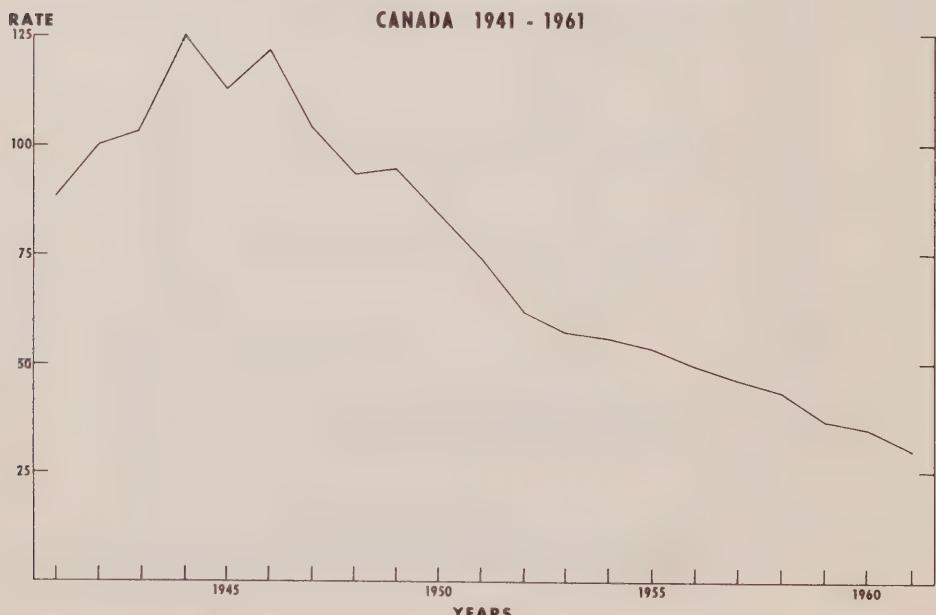
Fig. 3



PREPARED BY THE EPIDEMIOLOGY DIVISION, DEPT. N.H.&W.

NOTIFICATIONS
RATE PER 100,000 POPULATION
CANADA 1941 - 1961

Fig. 4



PREPARED BY THE EPIDEMIOLOGY DIVISION, DEPT. N.H.&W.

TABLE 5
HISTORICAL SUMMARY, BY PROVINCE, 1937-1962, NOTIFICATIONS OF NEW CASES OF TUBERCULOSIS,
NUMBER

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
1937	8,540	-	88	570	567	2,922	2,371	643	482	149	748	-	-
1938	9,025	-	85	707	669	2,907	2,519	588	303	386	861	-	-
1939	9,943	-	70	544	797	3,456	2,570	608	478	211	1,209	-	-
1940	9,846	-	78	522	566	3,196	2,580	627	395	272	1,610	-	-
1941	10,107	-	122	484	443	4,011	2,348	626	519	214	1,340	-	-
1942	11,711	-	101	368	567	5,336	2,560	713	516	190	1,360	-	-
1943	12,310	-	256	299	324	5,583	2,779	706	507	423	1,433	-	-
1944	14,949	-	233	283	298	7,674	2,731	798	514	426	1,992	-	-
1945	13,729	-	412	343	333	6,372	2,393	807	614	440	2,015	-	-
1946	14,607	-	311	455	526	5,766	2,769	1,090	652	502	2,536	-	-
1947	13,239	-	247	232	751	5,407	1,454	1,577	524	503	2,544	-	-
1948	12,021	-	74	286	576	4,899	1,576	1,491	543	508	2,068	-	-
1949	12,720	320	115	338	756	5,355	1,434	1,180	581	459	2,182	-	-
1950	11,562	624	86	282	763	4,897	1,431	603	537	512	1,827	-	-
1951	10,396	642	162	192	717	4,203	1,291	502	451	574	1,662	-	-
1952	9,537	511	120	177	437	1,187	1,287	550	458	399	1,411	-	-
1953	9,141	467	63	151	402	4,094	1,412	511	576	403	1,062	-	-
1954	9,122	491	98	146	357	4,196	1,363	437	560	394	1,080	-	-
1955	8,567	408	58	84	325	3,903	1,514	332	449	482	983	29	-
1956	7,930	385	44	112	375	3,512	1,334	376	355	500	930	7	-
1957	7,662	339	37	272	358	3,135	1,315	357	344	565	927	13	-
1958	7,215	273	53	264	436	2,912	1,274	331	307	525	821	13	-
1959	6,454	220	35	289	501	2,621	871	365	242	552	734	14	10
1960	6,345	424	41	234	435	2,663	789	280	294	513	659	13	-
1961	5,966	399	39	225	283	2,141	1,342	240	194	415	603	14	88
1962	6,284	468	46	228	307	2,439	1,226	288	375	519	6	180	

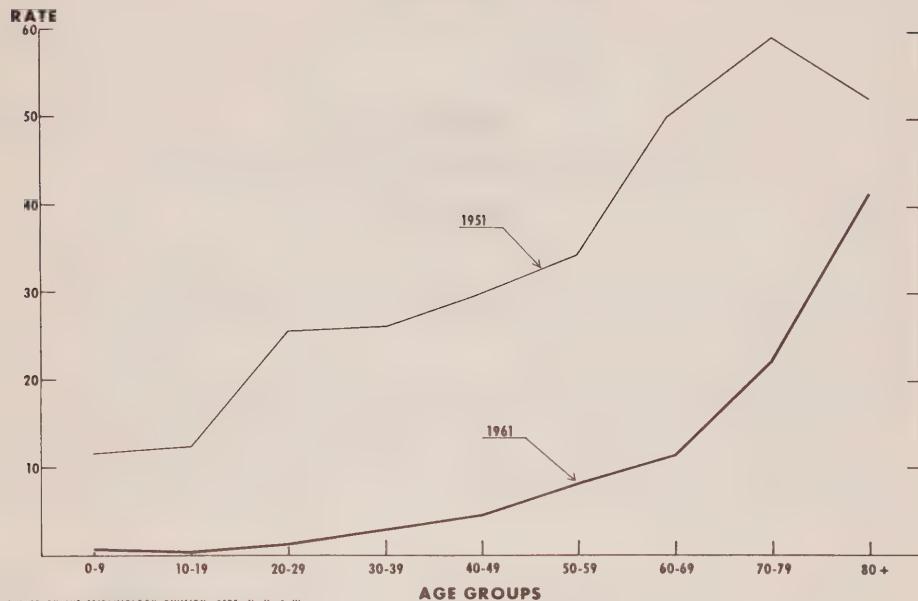
TABLE 5 (Concl'd)

HISTORICAL SUMMARY, BY PROVINCE, 1937-1962, NOTIFICATIONS OF NEW CASES OF TUBERCULOSIS,
RATE PER 100,000 POPULATION

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
1937	77.4	-	94.6	103.8	129.7	93.0	65.2	89.9	52.3	19.2	98.6	-	-
1938	81.0	-	90.4	127.4	151.4	91.3	68.6	81.7	33.2	49.4	111.1	-	-
1939	88.4	-	74.5	97.0	178.3	107.0	69.3	83.7	52.8	26.8	152.7	-	-
1940	86.6	-	82.1	91.7	125.3	97.5	68.9	86.1	43.9	34.4	200.0	-	-
1941	88.0	-	128.4	83.7	96.9	120.4	62.0	85.8	57.9	26.9	163.8	-	-
1942	100.6	-	112.2	62.3	122.2	157.4	65.9	98.5	60.8	24.5	156.3	-	-
1943	104.5	-	281.3	49.3	70.0	161.5	71.0	97.6	60.5	53.9	159.2	-	-
1944	125.3	-	256.0	46.3	64.6	219.3	68.9	109.8	61.5	52.7	213.7	-	-
1945	113.9	-	447.8	55.4	71.3	179.0	59.8	110.0	73.7	54.5	212.3	-	-
1946	119.1	-	330.9	74.8	110.0	158.9	67.7	149.9	78.3	62.5	252.8	-	-
1947	105.7	-	262.8	37.7	153.9	145.7	34.8	213.4	62.7	61.0	243.7	-	-
1948	93.9	-	79.6	45.8	115.7	129.3	36.9	199.9	64.8	59.5	191.1	-	-
1949	94.8	92.8	122.3	53.7	148.8	137.9	32.8	155.9	69.8	51.9	196.0	-	-
1950	84.5	177.8	89.6	44.2	149.0	123.4	32.0	89.8	64.5	56.1	160.7	-	-
1951	74.3	177.6	164.6	29.9	139.0	103.6	28.1	88.3	54.2	61.1	142.6	-	-
1952	66.1	136.6	120.0	27.1	83.1	100.3	26.9	81.3	54.3	41.0	117.1	-	-
1953	61.7	121.9	62.4	22.8	75.4	95.9	28.6	81.8	66.9	39.8	85.1	-	-
1954	59.8	124.3	97.0	21.7	66.1	95.6	26.6	89.8	64.1	37.3	83.4	-	-
1955	54.6	100.5	58.0	12.3	59.4	86.4	28.8	79.6	51.1	44.2	73.2	263.6	-
1956	49.4	92.8	44.3	16.1	67.6	75.9	24.7	80.7	40.3	44.5	66.5	58.3	-
1957	46.2	79.6	37.4	38.7	63.4	65.9	23.4	84.8	39.1	48.7	62.3	108.3	-
1958	42.4	62.3	53.0	37.2	75.6	59.6	22.0	80.7	34.6	43.7	53.6	100.0	-
1959	37.0	49.0	34.3	40.4	84.9	52.4	14.6	41.2	26.8	44.4	46.8	107.7	47.6
1960	35.7	92.4	39.8	32.4	72.5	52.2	13.0	31.1	32.3	40.0	41.1	92.9	-
1961	32.7	82.8	37.1	30.5	47.3	40.7	21.5	26.0	21.3	31.2	37.0	93.3	382.6
1962	33.8	99.5	43.4	30.5	50.5	45.4	19.3	30.8	21.7	31.2	40.0	75.0	75.0

TUBERCULOSIS
DEATH RATES PER 100,000 POPULATION BY AGE GROUP
CANADA 1951 - 1961

Fig. 5



PREPARED BY THE EPIDEMIOLOGY DIVISION DEPT. N. H. & W.

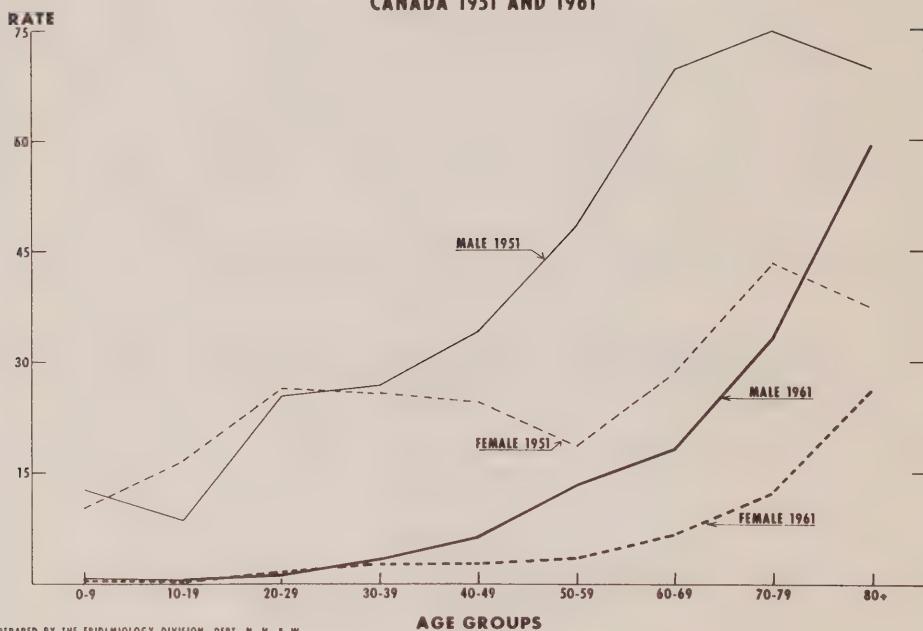
TABLE 6
DEATHS AND RATES PER 100,000 POPULATION
DUE TO TUBERCULOSIS, BY AGE,
CANADA, 1951, 1961

Age	1951		1961	
	Number	Rate	Number	Rate
Total.....	3,481	24.8	769	4.2
-10.....	357	11.4	30	0.7
10-19.....	275	12.6	15	0.5
20-29.....	572	25.8	30	1.3
30-39.....	537	26.3	77	3.0
40-49.....	475	29.4	98	4.6
50-59.....	417	33.8	133	8.5
60-69.....	471	50.1	137	12.8
70-79.....	298	59.2	154	22.8
80+.....	78	52.2	95	41.7
Not stated	1	-	-	-

Source: Compiled by Dominion Bureau of Statistics.

Fig. 6

TUBERCULOSIS
DEATH RATES PER 100,000 POPULATION BY AGE AND SEX
CANADA 1951 AND 1961



PREPARED BY THE EPIDEMIOLOGY DIVISION, DEPT. N. H. & W.

CHAPTER 2

REPORTING OF TUBERCULOSIS

While there has been a notable reduction in new cases the rate of decline has by no means paralleled the rapid reduction in deaths. This slower decline is shown in Table 5.

Only a few years ago the death rate was still our best gauge. This, however, means measuring our efforts by the final failure of treatment — not a positive approach. We have now adopted a new criterion, the number of new cases appearing yearly. Our standard is now based on the success we achieve in prevention.

NOTIFICATION OF NEW CASES

The trend in the notification of new cases is shown in Table 5. As case-finding services developed the number rose until 1944, reaching a peak of 14,949 in that year. There has been a steady decline to 1961 when 5,966 were reported. The corresponding rates per 100,000 population indicate a still more pronounced trend in the same direction.

READMISSIONS AND REACTIVATIONS

While statistics are lacking for a reliable picture of the trend of reactivations, some indication of the problem can be obtained from the number and rate of readmissions to sanatoria over the 23-year period. These data are shown in Table 12. It is noteworthy that the number of readmissions per 100 first admissions has increased from 48 in 1951 to 55 in 1961.

Patients are readmitted for two main reasons; first, because treatment at home is found to be unsatisfactory and improvement is not taking place or sputum has become positive; second, because there has been a reactivation of disease which was previously inactive. This will be discussed later in this study under "Post-Sanatorium Care and Supervision". At the National Tuberculosis Conference of 1960 it was recommended that provinces report to the Dominion Bureau of Statistics not only new cases of tuberculosis but also reactivations of inactive cases during the year. These reports are available for 1961 from all provinces except Quebec. When the rates are based on the number of inactive cases in the population rather than the population as a whole the rate

is very high; it is 685.28 per 100,000 as compared to 31.7 for new cases in the general population. This is shown in Table 9. The ratio of reactivation to new cases is set out in Table 7 for all provinces except Quebec.

TABLE 7
**RATIO OF REACTIVATIONS TO NEW CASES FOR CERTAIN
 PROVINCES FOR 1961**

	Nfld.	P.E.I.	N.S.	Ont.	Man.	Sask.	Alta.	B.C.	Yukon	N.W.T.
New....	379	39	225	1,160	240	197	415	603	14	88
Reactiva- tions ...	45	13	84	320	60	39	79	110	3	13
Ratio... (1-8.4)	(1-3)	(1-2.7)	(1-3.6)	(1-4)	(1-5)	(1-5.2)	(1-5.4)	(1-4.6)	(1-6)	

Source: Based on data supplied by Dominion Bureau of Statistics.

PREVALENCE ESTIMATES

While we have statistics on the mortality and occurrence (incidence) of tuberculosis, there is only very sketchy information available on the prevalence of the disease, i.e., the number of cases in the community during a certain period (e.g., one year) or on a certain date. The efforts to obtain such data are of very recent origin only and no comparisons with earlier years are possible. This is unfortunate because there are indications that the decline in the prevalence has not kept pace with the reduction in the number of new cases.

At the National Tuberculosis Conference referred to above an agreement was reached between the Dominion Bureau of Statistics and the provincial health departments to provide for the reporting of tuberculosis on such a basis that information would be available on new cases and also reactivations. It was further agreed that where possible figures for the number of cases on the register would be reported with information as to whether these were active or not. In this way prevalence figures could be obtained.

Progress in this project was reported at the Second National Conference in June 1962. While full information is not available from all provinces, Newfoundland, Prince Edward Island, New Brunswick and Alberta were able to give figures for all cases on the registers for December 31, 1961, on a comparative basis.

Two observations are evident from these figures: 1) the large population groups which still require careful supervision, and 2) the very high rate of reactivation from the inactive group, 685.28, as compared to 31.7 for the new case rate.

TABLE 8
INFORMATION ON TUBERCULOSIS PREVALENCE IN CERTAIN PROVINCES,
1961

Province	Active	Inactive	Activity Undetermined	Reactivations	Population
New Brunswick....	361	5,023	9	79	597,936
Newfoundland.....	1,363	7,795	437	28	457,853
Alberta.....	390	13,636	267	67	1,331,944
Prince Edward Island.....	106	832	2	13	104,629
Total	2,220	27,286	715	187	2,492,362
Estimate for Canada ¹	16,245	199,188	5,220	1,365	18,238,247

¹Based on the four provinces noted above.

Source: Based on data supplied by Dominion Bureau of Statistics.

TABLE 9
PREVALENCE FIGURES FOR CANADA, 1961

	Number	Rate per 100,000
Total new cases reported 1961.....	5,784	31.7
Total active cases on register.....	16,245	89.0
Total inactive cases on register	199,188	1,094.5
Total with activity undetermined	5,220	28.6
Total reactivated during 1961.....	1,365	685.28 ¹

¹Based on the total number of inactive cases on the Provincial Tuberculosis Registers.

Source: Provincial Tuberculosis Registers, 1961.

The prevalence estimates for Canada were checked with the statistics which are available from British Columbia from 1953-1962. This information is given in Table 10. These figures are not included in the prevalence estimates because reactivations are not included in British Columbia. For the other categories, active and inactive and activity undetermined, there seems to be a reasonable correlation.

It will be noted that while there has been a very significant decline in active cases in British Columbia the inactive load does not diminish. This is to be expected as the latter group is continually augmented by the addition of patients who have made a successful recovery and reached the inactive stage. These require a supervised follow-up to prevent relapses. This means of course that tuberculosis agencies in the field are still faced with an undiminished case load despite the decline in death rate incidence and admissions to institutions. This is likely to continue for another generation. This fact should be considered in the use of tuberculosis control grants.

TABLE 10

KNOWN CASES OF PULMONARY AND NON-PULMONARY TUBERCULOSIS IN
BRITISH COLUMBIA — EXCLUDING INDIANS,
1953 — 1962

Year	Active	Activity Undetermined	Inactive (incl. Arrested)	Total
1953	2,805	940	12,062	15,807
1954	2,657	939	12,555	16,151
1955	2,325	968	12,320	16,613
1956	1,829	834	14,434	17,097
1957	1,705	605	15,270	17,580
1958	1,722	543	15,690	17,955
1959	1,998	454	15,357	17,809
1960	1,655	259	15,167	17,081
1961	868	99	16,000	16,967
1962	730	0	15,561	16,291

Notes: The drop in total known cases in 1959 and an increase in active cases in this year is caused by a review of all cases classified as 'arrested'. Some were found to be deceased or no longer living in B.C., the majority of 'arrested' cases were reclassified to 'inactive', but some became 'active'. In 1960 a review of all 'active' cases was started in preparation for the 'active case registry' and this was completed in 1961.

In 1961 a review of 'inactive' cases was started and is continuing.

Source: Data received from the British Columbia Department of Health, Tuberculosis Division.

TUBERCULOUS FIRST ADMISSIONS AND READMISSIONS
TO SANATORIA
CANADA 1941 - 1961

Fig. 7

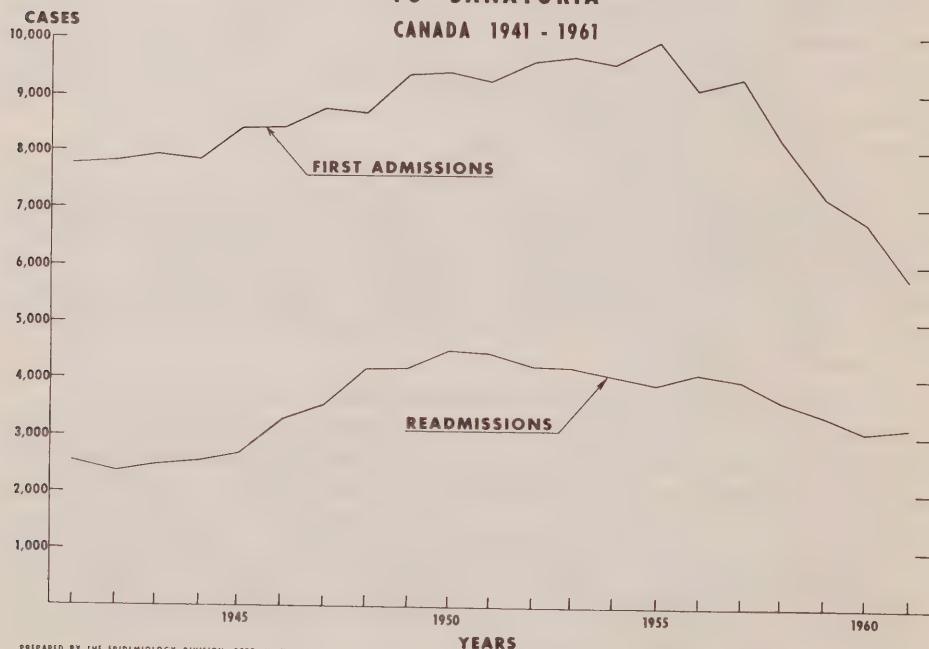


TABLE 11
TUBERCULOUS FIRST ADMISSIONS, CANADA AND PROVINCES, 1937-1962,
NUMBER

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories
1937	5,700	-	30	381	293	2,008	1,871	464	434	219	-	-
1938	6,429	-	46	414	286	2,101	1,945	457	451	314	415	-
1939	6,859	-	55	516	309	2,451	1,942	432	433	236	485	-
1940	7,444	-	53	450	316	2,949	2,017	530	395	252	482	-
1941	7,754	-	65	535	346	3,073	2,064	502	447	291	431	-
1942	7,816	-	63	541	395	3,061	2,007	497	467	293	492	-
1943	7,943	-	63	550	391	3,011	1,998	522	476	288	644	-
1944	7,878	-	43	495	328	3,193	2,019	442	461	276	621	-
1945	8,403	-	47	471	330	3,338	2,148	612	521	294	642	-
1946	9,476	-	132	740	434	3,472	2,408	606	535	553	596	-
1947	8,753	-	78	520	681	3,022	2,023	757	435	468	769	-
1948	8,663	-	74	410	527	3,119	2,213	709	418	483	710	-
1949	9,340	-	99	295	555	3,705	2,092	682	443	657	812	-
1950	9,440	182	95	312	531	3,830	2,254	522	409	557	748	-
1951	9,257	238	110	285	459	3,799	2,210	501	341	558	756	-
1952	9,580	269	99	485	477	3,605	2,225	513	405	581	789	132
1953	9,661	391	76	421	437	3,537	2,284	518	496	559	779	163
1954	9,523	593	88	473	382	3,393	2,044	548	488	552	851	111
1955	9,956	647	48	464	511	3,401	2,436	496	444	564	863	82
1956	9,092	622	42	483	425	3,103	2,227	456	364	540	755	75
1957	9,284	531	42	414	685	3,171	2,248	467	354	558	715	99
1958	8,238	538	49	360	487	2,782	2,080	396	325	546	610	65
1959	7,193	496	34	287	400	2,428	1,716	326	262	552	579	113
1960	6,754	543	38	241	450	2,297	1,493	277	328	530	466	91
1961	5,756	428	45	222	320	2,050	1,337	233	220	454	407	40
1962	5,494	474	36	197	339	1,836	1,289	310	199	431	359	24

TABLE 11 (Concl'd)
TUBERCULOUS FIRST ADMISSIONS, CANADA AND PROVINCES, 1937-1962.
RATE PER 100,000 POPULATION

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories
1937.....	55.5	-	32.3	69.4	67.0	63.9	51.4	64.9	47.1	28.2	-	-
1938.....	57.5	-	48.9	74.6	64.7	66.0	52.1	63.5	49.3	40.2	55.0	-
1939.....	61.0	-	58.5	92.0	69.1	75.9	52.4	59.5	47.8	30.0	61.2	-
1940.....	65.5	-	55.8	79.1	69.9	90.0	53.8	72.8	43.9	31.9	59.9	-
1941.....	67.5	-	68.4	92.6	75.6	92.2	54.5	68.8	49.9	36.5	52.7	-
1942.....	67.2	-	70.0	91.5	85.1	90.3	51.7	68.6	55.1	37.8	56.6	-
1943.....	67.4	-	69.2	90.8	84.4	87.1	51.0	72.2	56.8	36.7	71.6	-
1944.....	66.0	-	47.3	81.0	71.1	91.2	50.9	60.8	55.1	34.2	66.6	-
1945.....	69.7	-	51.1	76.1	70.7	93.8	53.7	84.2	62.5	36.4	67.7	-
1946.....	77.2	-	140.4	121.7	90.8	95.7	58.8	83.4	64.2	68.8	59.4	-
1947.....	69.9	-	83.0	84.6	139.5	81.5	48.4	102.4	52.0	56.7	73.7	-
1948.....	67.7	-	79.6	65.6	105.8	82.3	51.8	95.0	49.9	56.6	65.6	-
1949.....	71.4	-	105.3	46.9	109.3	95.4	47.8	90.1	53.2	74.2	73.0	-
1950.....	69.0	51.9	99.0	48.9	103.7	96.5	50.4	68.0	49.1	61.0	65.8	-
1951.....	66.2	65.9	111.8	44.4	89.0	93.7	48.1	64.5	41.0	59.4	64.9	-
1952.....	66.3	71.9	99.0	74.3	90.7	86.4	46.5	64.3	48.0	59.7	65.5	825.0
1953.....	65.1	102.1	75.2	63.5	82.0	82.9	46.2	64.0	57.6	55.2	62.4	1,018.8
1954.....	62.3	150.1	87.1	70.3	70.7	77.3	40.0	66.6	55.9	52.2	65.7	652.9
1955.....	63.4	159.4	48.0	67.9	93.4	75.3	46.3	59.1	50.6	51.7	64.3	455.6
1956.....	56.5	149.8	42.3	69.5	76.6	67.0	41.2	53.6	41.3	48.1	54.0	388.6
1957.....	56.0	124.6	42.4	59.0	121.2	66.6	40.0	54.3	40.3	48.1	521.1	-
1958.....	48.3	122.8	49.0	50.7	84.4	57.0	35.8	45.5	36.6	45.5	39.5	325.0
1959.....	41.2	110.5	33.3	40.1	67.8	48.6	28.8	36.8	29.0	44.4	36.9	538.1
1960.....	37.9	118.3	36.9	33.3	75.0	45.0	24.5	30.8	36.0	41.3	29.0	413.6
1961.....	31.6	93.4	42.9	30.1	53.5	39.0	21.4	25.3	23.8	34.1	25.0	173.9
1962.....	29.6	100.9	34.0	26.4	25.8	34.2	20.3	33.2	21.4	31.5	21.6	100.0

Source: Compiled by Dominion Bureau of Statistics.

Fig. 8

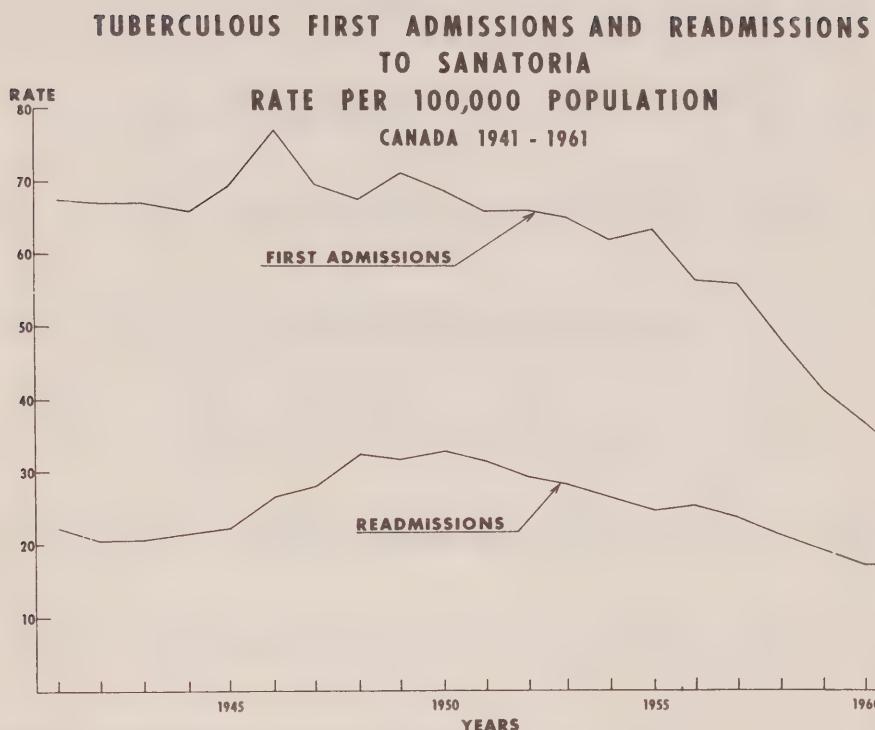


TABLE 12
TUBERCULOUS READMISSIONS¹, CANADA AND PROVINCES, 1937-1962,
NUMBER

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	North-west Territories
1937	1,876	-	14	110	103	461	504	378	254	52	-	-
1938	2,166	-	7	155	103	530	614	271	252	57	177	-
1939	2,325	-	14	164	109	575	656	264	259	60	224	-
1940	2,517	-	15	165	108	619	755	296	244	81	234	-
1941	2,547	-	14	182	122	619	726	284	234	112	254	-
1942	2,392	-	15	136	100	593	659	307	231	94	257	-
1943	2,447	-	12	185	71	602	697	306	218	87	269	-
1944	2,553	-	19	136	70	790	697	280	222	77	262	-
1945	2,685	-	12	166	93	794	756	327	200	72	265	-
1946	3,264	-	29	190	122	955	967	321	244	167	269	-
1947	3,504	-	31	258	285	983	946	290	267	144	300	-
1948	4,139	-	46	366	241	1,056	1,340	376	281	143	290	-
1949	4,146	-	59	324	184	1,083	1,145	405	333	216	397	-
1950	4,484	54	48	315	220	1,305	1,080	527	312	238	385	-
1951	4,415	55	56	316	312	1,264	1,055	459	259	228	411	-
1952	4,224	66	64	320	233	1,285	936	365	236	211	493	15
1953	4,197	107	37	272	252	1,183	1,063	342	220	238	445	38
1954	4,056	153	47	275	245	963	1,069	325	220	227	497	35
1955	3,886	186	23	230	200	1,230	915	234	226	208	416	18
1956	4,072	201	32	270	200	1,227	966	287	219	205	436	29
1957	3,956	208	24	208	198	1,189	962	261	213	244	431	18
1958	3,610	166	24	201	185	1,346	830	227	159	185	265	19
1959	3,350	184	29	181	163	1,225	725	184	171	218	241	29
1960	3,063	171	21	184	173	1,064	677	138	157	205	256	17
1961	3,166	150	23	159	190	1,271	655	107	125	240	238	8
1962	2,871	131	18	103	98	1,308	576	121	115	196	202	3

TABLE 12 (Concl'd)
TUBERCULOUS READMISSIONS¹, CANADA AND PROVINCES, 1937-1962,
RATE PER 100,000 POPULATION

Year	Canada	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	North-west Territories
1937.....	18.3	-	15.1	20.0	23.6	14.7	13.9	52.9	27.5	6.7	-	-
1938.....	19.5	-	7.4	27.9	23.3	16.7	16.7	37.6	27.6	7.3	23.4	-
1939.....	20.7	-	14.9	29.2	24.4	17.8	17.7	36.4	28.6	7.6	28.3	-
1940.....	22.1	-	15.8	29.0	23.9	18.9	20.1	40.7	27.1	10.3	29.1	-
1941.....	22.2	-	14.7	31.5	26.7	18.6	19.2	38.9	26.1	14.1	31.1	-
1942.....	20.6	-	16.7	23.0	21.6	17.5	17.0	42.4	27.2	12.1	29.5	-
1943.....	20.8	-	13.2	30.5	15.3	17.4	17.8	42.3	26.0	11.1	29.9	-
1944.....	21.4	-	20.9	22.3	15.2	22.6	17.6	38.5	26.6	9.5	28.1	-
1945.....	22.3	-	13.0	26.8	19.9	22.3	18.9	45.0	24.0	8.9	27.9	-
1946.....	26.6	-	30.9	31.3	25.5	26.3	23.6	44.2	29.3	20.8	26.8	-
1947.....	28.0	-	33.0	42.0	58.4	26.5	22.7	39.2	31.9	17.5	28.7	-
1948.....	32.3	-	49.5	58.6	48.4	27.9	31.3	50.4	33.5	16.7	26.8	-
1949.....	31.7	-	62.8	51.5	36.2	27.9	26.2	53.5	40.0	24.4	35.7	-
1950.....	32.8	15.4	50.0	49.4	43.0	32.9	24.2	68.6	37.5	26.1	33.9	-
1951.....	31.6	15.2	56.9	49.2	60.5	31.2	22.9	59.1	31.1	24.3	35.3	-
1952.....	29.2	17.6	64.0	49.0	44.3	30.8	19.5	45.7	28.0	21.7	40.9	93.8
1953.....	28.3	27.9	36.6	41.0	47.3	27.7	21.5	42.3	25.6	23.5	35.7	237.5
1954.....	26.5	38.7	46.5	40.9	45.4	21.9	20.9	39.5	25.2	21.5	38.4	205.9
1955.....	24.8	45.8	23.0	33.7	36.6	27.2	17.4	27.9	25.7	19.1	31.0	100.0
1956.....	25.3	48.4	32.2	38.8	36.1	26.5	17.9	33.8	24.9	18.3	31.2	150.3
1957.....	23.8	48.8	24.2	29.6	35.0	25.0	17.1	30.3	24.2	21.0	29.0	94.7
1958.....	21.2	38.6	24.0	28.3	32.1	27.6	14.3	26.1	17.9	15.4	17.2	95.0
1959.....	19.2	41.0	28.4	25.3	27.6	24.5	12.2	20.8	19.0	17.5	15.4	138.1
1960.....	17.2	37.3	20.4	25.4	28.8	20.8	11.1	15.4	17.3	16.0	15.9	77.3
1961.....	17.4	32.8	21.9	21.6	31.8	24.2	10.5	11.6	13.5	18.0	14.6	34.8
1962.....	15.5	27.9	17.0	13.8	16.1	24.4	9.1	12.9	12.4	14.3	12.2	12.5

¹ Excludes "to continue treatment" from 1952-1961.

CHAPTER 3

ORGANIZATION OF TUBERCULOSIS SERVICES IN CANADA

THE DEVELOPMENT OF PRESENT SERVICES

There has been no uniform pattern for the development of tuberculosis services in the different provinces. The services have been a combination of voluntary and official effort. In all provinces the first services were organized and financed by voluntary associations affiliated the Canadian Tuberculosis Association. Then gradually they were taken over by official agencies in part or in whole.

Diagnosis and Case Finding

Before development of diagnostic services the diagnosis was made in doctors' offices. Unfortunately, few patients reported until the disease was far advanced and consequently treatment came too late and death was the usual result.

The first efforts in early diagnosis were made by certain dispensaries and clinics in Montreal and Toronto. They were financed by voluntary associations. Later clinics were established in many centres, some by volunteer funds and some by municipal authorities. Always there was lack of money and when the X-ray came into use it too posed financial problems.

Usually the services were initiated with voluntary funds and later as their worth was demonstrated, they were taken over by official agencies as tax funds became available. This refers to regional clinics and later to mass surveys of whole communities. The institution of the Federal Grant Programme in 1948 made possible the extension of these case-finding services and included such projects as the routine X-ray of general hospital admissions.

The clinics became the agencies for the examination of contacts and the follow-up of discharged patients. They have not heretofore assumed the full task of treatment supervision which in the future they will share with other medical services. This will be discussed later.

Relative Value of the Various Case-finding Methods

Since it was demonstrated early in the campaign that tuberculosis which is diagnosed after the appearance of symptoms tends to be in an advanced and infectious stage a great deal of study and research have gone into the programme for early diagnosis.

First efforts along this line were the establishment of special clinics to which physicians could refer patients for special investigation or which the public could attend on a free basis. The next step was the periodic examination of contacts, persons exposed to the disease either at home or elsewhere. From this the routine examination of other population groups was undertaken.

Some valuable information on the methods of detection are available from the different provinces. Because the Province of Ontario is the largest population group and because its figures can probably be taken as representative of Canada as a whole, figures from epidemiological studies made by the Ontario Department of Health for 1961 are quoted in Table 13.

TABLE 13
METHODS OF DETECTION

	Total Number Active Cases	Percentage		New Active		Reactivated	
		1961	1960	Number	Percent-age	Number	Percent-age
Chest Clinic and Contacts	423	31.8	25.7	284	28.4	129	50.2
Private Physician General Hospital (excludes routine admission X-ray).....	246	18.5	21.7	184	18.4	50	19.5
Hospital Admission X-ray Programme ...	228	17.1	22.8	189	18.9	28	10.9
Other ¹	145	10.9	7.4	118	11.8	11	4.3
Community Survey	93	7.0	6.5	63	6.3	22	8.6
Industrial Survey	86	6.5	8.0	70	7.0	6	2.3
Jails.....	52	3.9	4.4	47	4.7	4	1.5
Pre-employment .	37	2.8	2.1	30	3.0	4	1.5
TOTAL	20	1.5	1.4	15	1.5	3	1.2
	TOTAL	1,330²	100.0	100.0	1,000³	100.0	257³
							100.0

¹ Includes immigration X-rays, X-rays of patients in homes for aged and Ontario hospitals. Statutory examinations of employees in sanatoria and public hospitals, recipients of public assistance and foster parents.

² In 373 cases, method of detection was not stated.

³ In 73 of the 1,330 cases information was not available as to whether New Active or Reactivated.

Source: Ontario Department of Health. *The Epidemiology and Management of Tuberculosis in Ontario, 1961*, Toronto: Queen's Printer.

This table shows the very high proportion of reported cases of tuberculosis which come from chest clinics and contacts, private physicians and hospital patients. Information from this table helps to direct attention to two groups that have a very high yield of active cases, e.g., contacts of known tuberculosis and persons with previous evidence of disease, even though it was supposedly inactive.

A smaller proportion of cases come from other surveys. Their discovery entails the examination of large numbers to find sources of infection in the general population. The ratio of such patients as set out in Table 14 is from the report for Ontario in 1961. Such reports as this provide valuable guides as to what population group should be examined and the frequency with which such surveys should be made.

Originally during these surveys, an attempt was made to X-ray all persons in the community. As every effort should be made to reduce unnecessary X-ray exposure, the use of the tuberculin test as a preliminary procedure eliminates a great deal of X-ray work in young people under 20 and even under 30 years of age. It should be noted, however, that the extent of radiation which a chest X-ray entails is relatively small and measures have been taken to eliminate unnecessary radiation by improvement of X-ray equipment and by proper monitoring of machines in use.

The figures cited in Table 13 point to some of the places which need most attention. Table 14 ranks the various population groups in terms of the yield of cases discovered.

Treatment Services

Treatment institutions developed by voluntary boards have usually been left under direction of these agencies. This applies to Ontario and Quebec, Manitoba, Saskatchewan, and certain institutions in New Brunswick and Prince Edward Island. Other institutions are operated by health departments, usually provincial, but occasionally municipal.

Indian and Northern Health Services, although using some provincial institutions for the treatment of Indians, have developed their own hospital services in most provinces except the Maritimes and Quebec. In Manitoba the Indian and Northern hospitals are operated by the Sanatorium Board of Manitoba and will be discussed later.

Over the years the cost of operating all treatment services gradually became the responsibility of governments, usually by way of a per diem grant from either the province, municipality or both.

A unique situation developed in Saskatchewan and Manitoba where all the functions of tuberculosis control were delegated by statute to semi-voluntary bodies, i.e., the Saskatchewan Anti-Tuberculosis League and the Sanatorium Board of Manitoba with the official agencies accepting the maintenance of the institutions by per diem or other grants. In Ontario and Quebec all the treatment

institutions are operated by independent voluntary boards. In Quebec these are either religious orders or voluntary independent boards. In five provinces all institutions, clinics and diagnostic services are directly under the Department of Public Health. These provinces are Nova Scotia, British Columbia, Alberta, Newfoundland and Prince Edward Island.

TABLE 14
COMPARATIVE YIELD OF ACTIVE TUBERCULOSIS FROM VARIOUS
POPULATION GROUPS AND SEGMENTS, ONTARIO, 1961

	Yield	Percentage Attendance (estimated)
Over-all yield for the province	1: 3,662	
Detection Programmes		
Community and Industrial Surveys	1: 3,896 (1: 2,625- 1: 5,698)	55
Hospital Admission Programme	1: 2,257	
Jail Programme	1: 410	
Close contacts of persons with active TB	1: 26	80 ¹
Population Segments		
Very High Yield:		
Persons with evidence of previous TB (reactivated)	1: 72 ²	
Indians	1: 411	
Infected (tuberculin-positive) persons	1: 758	
Relatively High Yield		
Males over 60	1: 1,188	36
Foreign-born	1: 2,137	
Males 20-60	1: 2,632	48
Relatively Low Yield		
Females over 60	1: 3,697	33
Females 20-60	1: 3,769	52
Canadian-born	1: 5,074	
Persons without previous TB (new active)	1: 5,488	
Very Low Yield		
Females under 20	1: 9,616	65
Males under 20	1: 10,866	68

¹ Based on a study of 1,387 close contacts of 249 patients with active tuberculosis (index cases).

² See text for basis of estimate, p. 18.

Source: Ontario Department of Health. *The Epidemiology and Management of Tuberculosis in Ontario, 1961*, Toronto: Queen's Printer.

Treatment Costs

Tuberculosis is a costly disease because the treatment has heretofore mainly taken place in hospital or sanatorium and has been measured in months or years. Table 17 shows reduction in length of stay which might be expected to de-

crease costs, but Table 15 shows that this expectation has not been realized due to increase in per diem costs. As an example, Table 16 shows only provincial institutional costs from 1945 to 1962. It has not been possible to add the costs of federal institutions or those beds included in general hospitals. Operating these hospitals alone during these 18 years has cost the taxpayers of Canada at least \$465 million with annual expenditures during the last ten years amounting to about \$30 million.

Figures are not available on provincial expenditures on tuberculosis except those for treatment in institutions (Table 16). Many of the public health services rendered by health officers and public health nurses are included in other budget items and cannot be separated. In addition, contributions of voluntary agencies to the cost of diagnostic and educational services cannot always be separated.

Table 15 shows costs in terms of "a constant 1949 dollar". Three indices were used to obtain a constant dollar expenditure series. Average wage series for the service industries was used to deflate net salaries and wages; the wholesale food price index was used to develop the food component while the wholesale non-food price index was used to develop all remaining expenditures.

TABLE 15
COST OF TUBERCULOSIS TREATMENT FOR CANADA,
1945-1962

Year	Actual Expenditure	Expenditure in Constant (1949) Dollars		
		Total	Per Capita	Per Patient-day
	\$000	\$000	\$	\$
1945	10,189	14,860	1.23	4.62
1946	11,483	15,962	1.30	4.85
1947	14,223	16,957	1.35	5.09
1948	17,043	17,757	1.38	5.05
1949	19,568	19,568	1.46	5.08
1950	22,893	21,828	1.59	5.02
1951	26,815	23,267	1.66	5.03
1952	29,184	25,435	1.76	5.62
1953	32,439	27,698	1.87	5.37
1954	31,520	26,462	1.73	5.74
1955	31,133	25,449	1.67	5.79
1956	32,003	25,426	1.62	6.14
1957	32,190	24,678	1.49	6.54
1958	29,607	21,800	1.25	7.26
1959	-	-	-	-
1960	31,900	22,924	1.28	7.48
1961	33,716	23,822	1.21	9.68
1962	33,102	22,556	1.21	9.55

Source: Dominion Bureau of Statistics, *Tuberculosis Statistics, 1962, Financial Supplement*, Ottawa: Queen's Printer.

TABLE 16
TOTAL OPERATING EXPENDITURE IN TUBERCULOSIS SANATORIA , 1945-1962

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	N.W.T.
(thousands of dollars)												
1945.....	10,189	-	96	446	579	2,356	3,779	551	907	245	1,231	-
1946.....	11,573	-	157	515	701	2,518	4,238	642	1,177	285	1,341	-
1947.....	14,223	-	209	668	1,102	2,847	5,195	736	1,387	334	1,744	-
1948.....	17,043	-	222	822	1,342	3,310	6,247	804	1,599	427	2,270	-
1949.....	19,166	-	216	956	1,476	3,791	6,995	881	1,621	503	2,728	-
1950.....	22,893	793	234	1,355	1,649	5,066	7,181	1,198	1,711	1,028	2,678	-
1951.....	26,815	858	305	1,458	1,929	6,938	7,821	1,463	1,866	1,264	2,913	-
1952.....	29,184	1,458	289	1,490	1,754	7,657	8,185	1,335	2,092	1,382	3,541	-
1953.....	32,204	1,641	303	1,756	2,206	9,179	8,578	1,307	2,159	1,275	3,800	-
1954.....	31,180	1,808	338	2,021	2,196	7,162	9,012	1,301	2,230	1,443	3,668	-
1955.....	31,133	1,855	276	2,079	2,115	7,605	9,000	1,168	1,885	1,706	3,443	-
1956.....	32,003	1,862	277	2,217	2,246	7,956	9,144	1,205	1,847	1,942	3,307	-
1957.....	32,190	1,624	253	2,198	2,403	8,012	9,352	1,284	1,940	2,219	2,905	-
1958.....	30,410	1,600	261	2,253	2,490	6,598	9,243	1,418	1,887	2,364	2,296	-
1959.....	29,607	1,569	282	2,031	2,229	6,625	9,082	1,358	1,900	2,539	1,992	-
1960.....	31,900	1,613	301	2,069	2,302	9,440	7,941	1,410	1,848	2,274	2,037	665
1961.....	33,716	1,733	321	2,226	2,426	11,292	7,778	1,412	1,690	2,408	1,893	510
1962.....	33,101	1,825	333	2,200	2,257	11,694	7,542	1,661	1,354	2,427	1,805	-

Source: Dominion Bureau of Statistics, *Tuberculosis Statistics 1962*, Financial Supplement, Ottawa: Queen's Printer.

TABLE 17
LENGTH OF STAY - TB FIRST ADMISSION AND READMISSION DISCHARGES

Source: Compiled by Dominion Bureau of Statistics.

TABLE 18
COST PER PATIENT-DAY, CANADA AND PROVINCES, 1944-1962

Year	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	N.W.T.
1944	2.85	..	2.82	2.65	2.88	2.42	2.96	2.76	2.95	2.87	3.71	
1945	3.17	..	3.18	2.82	3.04	2.74	3.17	2.80	3.24	3.18	5.42	
1946	3.49	..	3.64	3.31	3.46	2.92	3.50	3.23	3.86	2.76	5.48	
1947	4.27	..	4.53	4.02	4.26	3.33	4.25	3.66	4.74	4.75	8.14	
1948	4.85	..	4.28	4.71	4.86	3.69	4.91	3.98	5.55	5.37	8.34	
1949	5.08	..	4.34	5.49	5.30	3.74	5.05	4.35	5.59	4.76	10.22	
1950	5.24	5.99	4.32	5.81	5.88	4.04	5.07	4.83	5.74	6.31	9.77	
1951	5.87	5.86	5.31	6.58	6.76	4.77	5.49	5.80	6.60	7.45	10.63	
1952	6.18	6.63	6.63	6.55	7.00	5.03	5.75	5.35	7.38	7.25	12.35	
1953	6.29	6.60	6.31	6.97	7.69	5.13	5.84	5.53	7.75	6.69	12.16	
1954	6.84	7.62	6.39	8.05	8.50	5.27	6.34	5.85	8.06	7.63	13.10	
1955	7.08	7.76	6.78	8.37	8.61	5.67	6.47	5.92	7.15	9.14	14.07	
1956	7.55	7.99	8.30	10.72	9.48	5.77	6.91	6.34	7.58	10.51	15.80	
1957	8.54	8.99	8.29	11.20	10.32	6.63	7.99	7.02	9.19	12.75	15.78	
1958	9.22	9.71	8.70	11.54	11.47	6.84	8.81	7.90	10.32	14.84	14.60	
1959	9.86	10.79	10.52	13.49	12.11	6.76	10.11	7.69	11.77	17.09	15.37	
1960	10.41	11.44	11.49	15.65	12.91	7.67	11.38	8.41	12.10	15.38	16.83	9.62
1961	12.87	13.58	12.38	17.82	15.10	10.74	12.78	10.89	14.72	17.92	17.70	14.16
1962	14.02	14.86	15.27	19.80	16.24	11.98	14.50	10.38	16.82	20.12	16.82	

Source: Dominion Bureau of Statistics, *Tuberculosis Statistics 1962*, Financial Supplement. Ottawa: Queen's Printer.

TABLE 19
PER DIEM COST IN PUBLIC GENERAL HOSPITALS, CANADA AND PROVINCES, 1952-1961
(excluding newborn days)

	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
						(dollars)					
1952.....	11.67	—	8.44	8.71	10.47	10.75	12.98	10.41	9.61	10.70	13.78
1953.....	12.80	9.61	8.88	10.65	11.77	11.93	13.85	11.09	10.57	12.33	15.63
1954.....	13.78	10.43	9.49	11.24	12.79	13.14	14.96	12.32	11.48	13.43	15.60
1955.....	14.61	12.09	10.78	13.26	13.64	14.42	15.41	12.97	12.72	14.28	16.33
1956.....	15.38	12.91	10.49	13.68	14.33	14.96	16.52	13.78	13.99	14.42	16.69
1957.....	16.77	16.33	11.40	14.50	15.85	16.20	17.84	15.35	15.35	16.41	18.12
1958.....	18.39	15.47	11.81	16.12	17.65	18.51	19.28	17.18	17.17	17.70	19.28
1959.....	20.45	17.55	13.90	18.46	19.87	20.17	21.75	19.69	19.14	18.62	21.60
1960.....	22.75	19.74	16.74	21.34	21.52	23.92	24.03	21.91	20.39	19.71	22.78
1961.....	24.32	19.92	19.06	23.61	23.97	25.26	25.85	23.68	21.16	21.17	23.58

Source: Dominion Bureau of Statistics, *Tuberculosis Statistics 1962*, Financial Supplement. Ottawa: Queen's Printer.

TABLE 20
PATIENT-DAYS OF TUBERCULOUS DISCHARGES, CANADA, 1947-1961

Year	First Adm.	Readm.	Total
1947.....	n.a.	n.a.	3,322,959
1948.....	"	"	3,786,050
1949.....	"	"	4,131,943
1950.....	"	"	4,911,351
1951.....	"	"	5,220,516
1952.....	"	"	5,489,853
1953.....	"	"	6,222,498
1954.....	3,828,859	1,549,661	5,378,520
1955.....	3,706,770	1,444,236	5,151,006
1956.....	3,308,270	1,286,739	4,595,009
1957.....	3,089,018	1,233,516	4,322,534
1958.....	2,692,277	1,057,722	3,749,999
1959.....	2,349,795	986,170	3,335,965
1960.....	2,075,331	829,775	2,905,106
1961.....	1,717,186	712,891	2,430,077

Source: Compiled by Dominion Bureau of Statistics.

Increase in Treatment Costs

The increasing per diem cost of operating all institutions has overshadowed the reduction in patient-days so that the over-all cost is relatively small. In 1953, the peak year for tuberculosis treatment, there were 6,222,498 treatment-days provided in provincial institutions at a cost of \$32,439,000. In 1961 there were 2,430,077 patient-days — a drop of more than 60 per cent. The cost of this treatment was \$29,877,000 — a drop of less than 10 per cent.

Introduction of Free Treatment

Because the treatment of tuberculosis has been long and costly, many patients, prior to the introduction of free treatment, were unable to remain in sanatoria as long as necessary. While there was some provision for the indigent, the definition of indigency was often in doubt. Many people who were not indigent in the legal sense were unable to finance a long period of sanatorium treatment. Sustained efforts were, therefore, made to provide free treatment. Submission from voluntary bodies, and municipal authorities influenced the government to introduce legislation providing for the free treatment of tuberculosis of all residents of the Province of Saskatchewan. This was the first time that such legislation had been passed in any Canadian province. Saskatchewan initiated it in 1929 and Alberta in 1933. Six other provinces achieved it later and treatment is now free by statute in seven provinces; British Columbia, Quebec, and Ontario are the exceptions. In Ontario, it is nominally free and only a few patients are required to pay the full cost. Lack of money is no bar to treatment anywhere in Canada.

Fig. 9

TUBERCULOUS TREATMENT COSTS FOR 16 YEARS*
CANADA 1945 - 1961

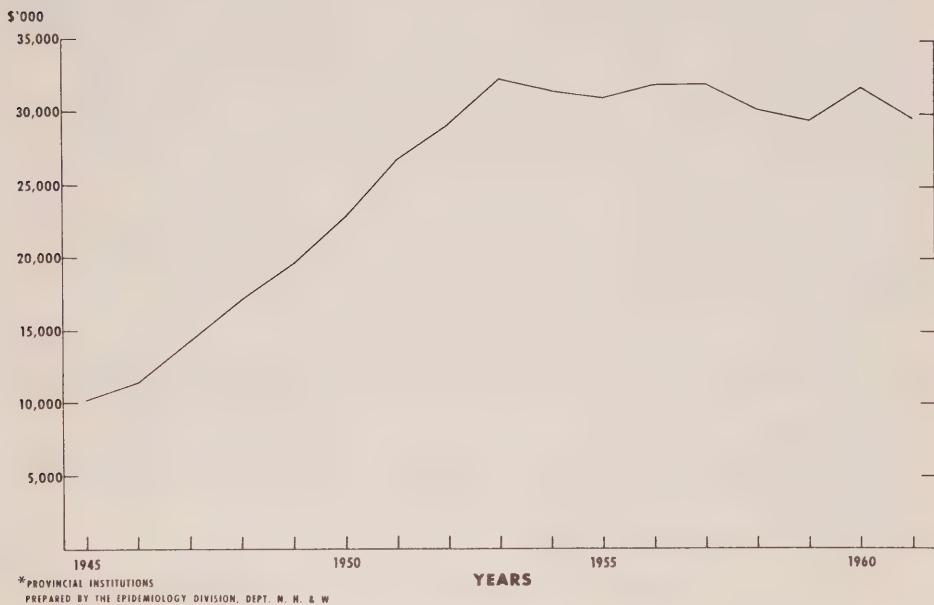
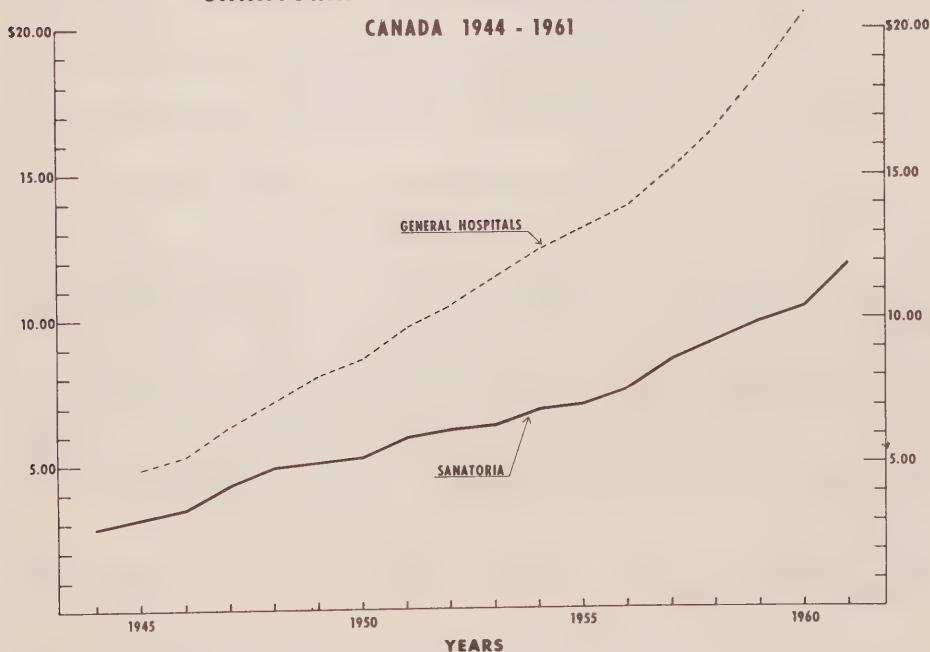


Fig. 10

COMPARISON OF PER CAPITA COST OF SANATORIA AND GENERAL HOSPITALS
CANADA 1944 - 1961



POST-SANATORIUM CARE AND SUPERVISION

While the periodic review and re-examination of the ex-patient has always been necessary it is doubly so now since the advent of the newer drugs has revolutionized treatment. Instead of the long periods of sanatorium treatment of the past there is now a shorter period in hospital with a period of 18 months to two years on drug treatment at home. There are even cases where treatment of a non-infectious patient is carried out entirely on a domiciliary basis and the patient may be allowed to carry on his usual occupation while still on drug therapy. In such a setting it is most necessary that there be supervision. If there is not, it can be expected that the break-down rate will go up.

An important part of the follow-up service is the maintenance of the case register. Such registers give information on every case in the community. In 1962, they were in operation in nine of the ten provinces. Quebec introduced a register in 1963, completing the national picture.

Valuable information has come to light on the effectiveness of post-sanatorium treatment and supervision. There are indications that existing provisions are by no means adequate. Dr. E. A. Allen of the Ontario Division of Tuberculosis Control has recently reported on a study of 500 patients following their discharge from Ontario sanatoria.¹ His findings indicate clearly that efforts to improve follow-up services are badly needed.

Points emphasized in Dr. Allen's report are:

- i. Twenty-five per cent failed to complete the recommended course of drugs.
- ii. Seventy-five per cent were not told to report for follow-up recheck until three months after discharge which was wholly inadequate for the people who were still undergoing treatment.
- iii. Only sixty per cent had fulfilled the minimum of three clinic visits in the first year. This is also considered quite inadequate.
- iv. Only thirty per cent returned sputum specimen bottles which had been given to them.
- v. Less than ten per cent took a total of 12 months antimicrobial therapy following discharge.

The difficulty of getting patients, after they have left hospital, to take drugs in the amount and at the times prescribed can be scarcely overstated. In hospital they were assisted by staff supervision. At home there is, frequently, no one to remind them if they forget or persuade them to continue if they are reluctant or hostile. Whether or not patients continue to follow prescribed treatment will depend on a number of factors. Chief of these is the patient's own intelligence and the degree to which he is impressed with the necessity of keeping to his regimen. Next in importance is his conviction that others are interested in him and that he has their support in this somewhat tedious business.

¹ Allen, E.A., Stewart, M., Jeney, T., "Efficiency of Post-Sanatorium Management of Tuberculosis", *Canadian Journal of Public Health*, Aug. 1964.

Our objective should be to provide as nearly as possible an environment similar to the hospital and so convince the patient of the importance of persistence in drug treatment. Several health disciplines are needed to co-operate in such supervision. First of these is the clinic, which he should visit frequently. If attendance is not regular it may require a call to the home not only by the public health nurse but also by the clinic physician. It seems logical that the family physician should assume some responsibility in this matter and, of course, some adequate remuneration will be necessary. In the days when lung collapse or pneumothorax was used after patients were discharged, some provinces provided for this service by engaging certain physicians trained for this purpose. Fees for the service were paid by the Department. Ontario passed legislation during the 1962-63 session of the Provincial Legislature which enabled the Department of Health to include in its budget funds to pay private physicians' fees for after-care supervision. In this way, it is hoped to insure that all tuberculosis patients on the registry will receive after-care from some source. It is suggested that health grants might be used for this purpose on a fifty-fifty basis with the provinces, thereby helping to solve this important problem of inadequate after-care.

It is suggested that the provinces should assume financial responsibility for after-care as they now do for treatment in sanatoria. A service such as was devised to provide pneumothorax could be set up for after-care. It would cover both visits of the doctor to the home and the patient to the doctor's office. Administration would be by the health department or whatever agency is providing medical care in the province concerned.

HEALTH GRANTS

Since 1948 the Federal Government has made available to the provinces health grants for tuberculosis of approximately \$4 million per annum. These grants were for the purpose of developing new services and modernizing existing ones. They have been invaluable in raising standards in all the provinces. They have made possible increases in staff, purchase of equipment for institutions and clinics and the free use of the newer drugs which became available during the first years of the grants programme. The grants helped to extend early diagnostic services such as clinics, mass surveys and the routine X-ray of hospital admissions and rehabilitation. Funds for research have also been provided from the grants.

These grants were allocated to the provinces on the following formula: 50 per cent of the amount was divided among the provinces on a population basis and the other 50 per cent on the basis of the five-year death rate from tuberculosis. The purpose of the latter allocation was to encourage provinces having a high death rate and a disproportionately large tuberculosis problem to expand their services.

This provision worked well when there was a marked variation in death rates between the provinces. It meant, however, that there was continual adjustment, since the money available changed with the death rate. The extent of the variation can be seen by comparison of disbursements in the fiscal year 1952-53 as compared to 1961-62, set out in Tables 22 and 23. It appears clear that the time has come when the grants should be put on a population basis and made statutory. The provinces would then have a more accurate idea of the amount they could expect and could make long-range plans with more confidence.

Long-range plans, particularly plans for adequate domiciliary care, are urgently needed. There has been general failure to admit that the closing of sanatorium beds should be balanced by expansion of chest clinic services. The chief reason for failure to cope with the situation seems to be lack of staff which, in turn, depends on lack of sufficient funds on which the provinces can depend.

It seems reasonable to ask that since Health Grant funds are now seldom needed to pay for increases in sanatorium staff or installation of new equipment, as they were some years ago, that a sizeable portion of this money be allocated

to the provinces for provision of adequate after-care and that such grants be made statutory. This would enable directors of tuberculosis control to engage the full- and part-time staff needed and to avail themselves of the services of general practitioners and internists where indicated.

TABLE 21
TUBERCULOSIS CONTROL GRANT, CANADA AND PROVINCES, 1948-1962

	Available	Expended	Per cent utilized
CANADA.....	\$55,544,862	\$51,654,874	93
Newfoundland.....	2,639,001	2,348,599	89
Prince Edward Island	681,478	578,110	85
Nova Scotia.....	2,689,318	2,854,265	106
New Brunswick.....	2,313,958	2,254,010	97
Quebec.....	19,474,988	21,505,091	110
Ontario.....	13,520,518	9,929,868	73
Manitoba	3,080,952	2,367,461	77
Saskatchewan.....	2,868,852	2,786,162	97
Alberta.....	3,314,594	2,994,404	90
British Columbia	4,833,071	3,803,111	79
Northwest Territories	80,088	57,275	72
Yukon.....	48,044	176,518	367

Source: Compiled by the Directorate of Health Services, Department of National Health and Welfare.

TABLE 22
TUBERCULOSIS CONTROL GRANT, CANADA AND PROVINCES, 1952-53

	Available	Expended	Per cent utilized
CANADA.....	\$4,239,531	\$4,292,303	101
Newfoundland.....	212,151	201,816	95
Prince Edward Island	55,327	44,579	80
Nova Scotia	218,946	253,596	116
New Brunswick	187,254	142,884	76
Quebec	1,450,274	1,950,128	134
Ontario	1,010,878	781,150	77
Manitoba.....	240,542	231,854	89
Saskatchewan.....	225,407	216,002	96
Alberta	254,892	241,001	94
British Columbia.....	370,329	239,438	65
Northwest Territories	8,484	2,808	33
Yukon	5,047	5,047	100

Source: Compiled by the Directorate of Health Services, Department of National Health and Welfare.

TABLE 23

TUBERCULOSIS CONTROL GRANT, CANADA AND PROVINCES, 1961-62

	Available	Expended	Per cent utilized
CANADA.....	\$3,500,000	\$3,249,366	93
Newfoundland.....	161,536	143,814	89
Prince Edward Island.....	28,702	28,702	100
Nova Scotia	138,441	138,441	100
New Brunswick	126,123	126,123	100
Quebec	1,290,896	1,231,891	95
Ontario	897,235	729,431	81
Manitoba.....	180,387	167,861	93
Saskatchewan.....	151,234	159,210	105
Alberta	215,218	215,218	100
British Columbia.....	300,196	274,333	91
Northwest Territories	6,131	12,000	196
Yukon	3,901	22,342	573

Source: Compiled by the Directorate of Health Services, Department of National Health and Welfare.

CHAPTER 5

INTEGRATION OF TUBERCULOSIS WITH GENERAL MEDICAL SERVICES

PRESENT ISOLATION

Over the years there has been a distinct trend toward separation of tuberculosis from general medicine. The separation was the result of the way in which the sanatorium movement developed. Because tuberculosis is an infectious disease the early treatment centres were built in remote areas where the services of full-time medical staff were the only practical kind. Part-time service was tried but for several reasons was not satisfactory.

The exception to this general rule was surgical service. This has been mainly on a part-time basis. While a number of institutions employed full-time surgeons, the volume of surgery has declined with the advent of drug treatment and the reduction of the patient load. A part-time surgical service worked very well, the surgeon being employed on a payment-for-service basis or an honorarium.

No such satisfactory result was achieved when physicians were engaged on a part-time basis for work in the hospital. Experience showed that as a physician's practice grew he had less and less time to give to tuberculosis services. This was unfortunate as the length of illness made patients peculiarly vulnerable to discouragement and they needed sustained attention from their physicians to help them maintain their morale. In addition, the physician needed to be available at all hours and the part-time physician was usually only available in the morning. Experience showed that the only doctor likely to be on call day or night was the one living in the institution or at least on the grounds.

Another difficulty was that the tuberculosis doctors' services were needed for extra-mural work in clinics and surveys and these busy doctors could not add to their work load.

For these reasons, full-time service was found far more efficient than part-time service. Added to this, it was not very difficult at that time to recruit physicians for full-time work from the ranks of the patients. In those days of high infection rates doctors and medical students were frequent victims of TB. They

became interested in the disease and accustomed to institution life, even in remote places, and on recovery moved into the ranks of staff. No sizeable number of physicians now have their interest in tuberculosis roused in this manner because happily steps taken to prevent doctors and medical students from contracting this disease have met with great success. The result of this change, coupled with the transfer from the sanatorium to the home for the last months of treatment, means that a new approach is needed for the tuberculosis services.

Little has been said of the difficulties in obtaining other staff such as nurses for tuberculosis services, except that they were considerable. Isolation played a great part. The problem is not so acute now since many isolated institutions have been either closed or converted to other purposes. It is easier to obtain staff when institutions are in or near the urban centres.

FUTURE SERVICES

There are many factors which will change the pattern of the future tuberculosis services. The advent of the newer drugs has brought a vast change. The prognosis has improved greatly and length of treatment has changed. Surgery is rarely necessary and much of the treatment can be carried on a domiciliary basis and even while the patient remains in employment.

There will be great changes in tuberculosis institutions. Already bed complement has been reduced by 50 per cent. Many institutions will be closed or converted to other uses. Tuberculosis may be treated in special wards of general hospitals and it may be possible to utilize attending staff. Many patients will be treated at home. This will place more responsibility on the family physician to supervise the drug treatment of the patient. In this he will have the help of the local clinic, and will have access to the necessary laboratory facilities.

But most necessary will be a plan whereby the physician is part of a team which is supervised from the clinic centre and the case register. Standards for supervision of after-care will need to be worked out and adequate remuneration made available for the general practitioner to compensate for time spent on the treatment of tuberculosis. This would be in line with remuneration for other medical services.

The service requires an over-all supervision and direction of the health department using the case register as a basis. For this reason, fragmentation of the service would result if it were made entirely the responsibility of general medical services. This has already happened to some extent with the introduction of the National Health Services in Britain. As a result the chest services, with particular respect to tuberculosis, tend to be spotty and lack uniformity.

In Canada integration is possible, up to a point, but it requires over-all supervision. It is possible that greater use can be made of part-time internists trained in all phases of respiratory disease. These men are particularly needed in the teaching hospitals of the country. Some upgrading of their positions will be necessary in order to obtain both full-time and part-time physicians for teaching

purposes. The full-time directors of tuberculosis services and other personnel should be required to have training and experience equal to that of specialists in other fields and remuneration should be on the same standard as general internists and specialists.

Such upgrading with additional remuneration and responsibilities would make the service more attractive for the full-time and part-time physician and make his services more useful. There is at present wide variation in remuneration for medical specialists in provincial services as compared with DVA or even National Health and Welfare. Lower still are salaries paid by voluntary boards and there is still wide variation in superannuation benefits. An entirely new basis for payment of part-time physicians based on qualifications and services rendered needs to be introduced if the family physician and the internist are to be utilized in the case of the tuberculous.

TREATMENT IN SANATORIUM OR GENERAL HOSPITAL

As already mentioned, the treatment of tuberculosis in wards in general hospitals has been suggested as the policy of the future. This matter needs careful consideration. In the past, sanatoria have operated at considerably lower costs than general hospitals – in fact as much as 50 per cent lower (see Figure 10 and Tables 18 and 19). This financial advantage still holds where a sanatorium is able to keep its beds occupied. However, as the patient load falls, overhead increases and the same financial advantage does not obtain. Where it has been possible to abandon or convert an entire institution, great savings have been effected. However, even though many beds have been unoccupied (thereby adding to the overhead) and operating expenses have shot up, the cost of operating sanatoria dropped by nearly \$3 million between 1953 and 1961. It did not amount to the saving that was hoped for but neither was it negligible.

It appears certain that many sanatorium beds will be converted to other uses or closed in the next few years. The question to be settled, on a regional basis, is when it would be more economical to treat tuberculosis in a general hospital, even though the per bed cost is higher, than to keep open an institution. Cost will not, of course, be the only factor in the decision. The sanatoria which are centrally located, and particularly those which are near university centres, will doubtless be maintained longer than others because they serve as teaching centres for diseases of the chest generally.

Comparable figures for salary schedules from the many provincial tuberculosis services are not available, but it can be said that they are definitely lower than federal services and more so as compared to those in private practice.

The question arises as to the anticipated number of beds needed in general hospitals in the years ahead if tuberculosis were to be treated there. Such an estimate is difficult to prepare and the situation will vary from province to province. Hospital days have fallen from 6,222,498 in 1953 to 2,430,077 in 1961, which is just over 7 per cent a year for 8 years. These are factors which must be considered.

The inclusion of tuberculosis in the general hospitalization plans will facilitate the utilization of many unneeded tuberculosis beds thus compensating at least to some extent for the use of wards in general hospitals by tuberculosis patients when this policy becomes advisable.

Similar situations have arisen in other countries, such as Denmark and Norway, as described in Chapter 7. Similar developments are taking place in Great Britain and the United States. None of these countries has completely solved the problem of integration on one hand and the disposal of existing facilities on the other.

Source of Funds for Treatment Costs – Should Tuberculosis be Integrated with General Hospitalization?

The cost of the hospitalization of TB patients has usually been met by a special item in the budget of the health department of the province or shared with the municipalities. Hospital care of the tuberculous should be included in the over-all hospitalization plan. If it were included administrators would have more latitude in converting the unoccupied beds for other uses. This is urgent since the demand for hospital beds shows every sign of a steady increase.

Institutions partially converted to other uses and with some services operated under the Hospital Services Commission are, at present, faced with two different methods of accounting and two different grants or budget formulae, one by grants from the Department of Health and the other from the Hospital Services Commission. While the cost formulae for tuberculosis in such a province as Ontario has proven satisfactory in the past it seems obvious that it will become necessary to use the cost formulae of the Hospital Services Commission in the future.

CHAPTER 6

CHANGING GOALS OF TUBERCULOSIS CONTROL

CONTROL

Tuberculosis programmes in the past have been built on the concept that the best we could do would be to control tuberculosis by reducing it to a point where it would be possible to provide free diagnostic and treatment service for all who required it. Total eradication was then considered impossible.

ERADICATION OF TUBERCULOSIS NOW POSSIBLE

Progress in some areas of Canada and in some other countries indicates that complete eradication is possible. For all practical purposes tuberculosis has been eradicated in cattle in Canada. This was achieved by thorough and sustained use of the tuberculin test to identify infected animals. Infected animals were destroyed and the owners paid compensation. Large-scale tests in recent years demonstrate that the rate of positive reactors is less than one per cent.

The eradication programme in humans will come about by the identification and treatment of all cases of tuberculosis. This will gradually lessen the possible reservoir of infection until a disease free area for humans is developed.

The experts in the World Health Organization have given a good deal of thought to a standard by which a country could measure how near it had come to the elimination of tuberculosis as a public health problem. Their conclusion is that a country (or province) has control of tuberculosis when not more than one per cent of children of school-leaving age are positive to the tuberculin test. Canada has some localities which could pass this test, but as yet no entire province, and there are some areas and groups which are many years away from reaching such a goal.

When such a state is reached, continued public health supervision will still be necessary. There have already been a number of local outbreaks of disease in tuberculin negative population groups. Outbreaks of tuberculosis in school children have occurred in Alberta, Saskatchewan and Nova Scotia. These local outbreaks can be controlled by intensive case finding and prompt treatment of all cases found. Surveys and sufficient staff to carry out such local campaigns will need to be kept in readiness.

PLACE OF DRUGS IN ERADICATION PROGRAMME

With the advent of the drugs between 1947 and 1953, a dramatic change came about. The first drug, streptomycin, resulted in a great improvement in many cases. However, disappointment resulted when resistance developed rather quickly. Fortunately two other drugs became available, PAS (para-aminosalicylic acid) and INH (isoniazid), the latter the most effective of the three. The important consequence of the use of two or more drugs used simultaneously was that by so doing the onset of resistance was delayed. In fact some authorities, notably Professor John Crofton of Edinburgh, maintain that resistance practically never develops if two drugs are given regularly and without interruption for at least eighteen months.

This concept has led to a great change in treatment practices. While sanatorium or hospital treatment is advisable initially, most patients can be treated at home and can even resume work when the sputum becomes negative and no symptoms are present. However, the drugs must be taken regularly without interruption. If they are not taken consistently, reactivation is apt to occur. Moreover, the tubercle bacillus is apt to become resistant, which complicates treatment and often results in "treatment failure", the bugbear confronting the physician and the patient.

Thus, tuberculosis still presents a real problem. Our present long-term patients in hospital are usually those who have become resistant to known drugs and for whom only the old methods of rest are available. If they were at home, they would be a source of infection to families and friends and a double threat because the germs they may pass on to others are of drug resistant strains.

These are facts not always appreciated by the public, physicians, or public health administrators who are responsible for maintaining adequate services for preventing spread of this disease.

Because treatment days in sanatorium are fewer, institutions are closing and provincial budgets for their maintenance can be reduced, therefore it is often not appreciated that diagnostic and follow-up services are required and may need to be expanded to take care of the increased load of patients not in the hospitals but at home on drugs. *To these services provincial expenditures and national health grants will need to be devoted.*

CHAPTER 7

CHANGING TRENDS AND PROGRAMMES IN OTHER COUNTRIES

Among European countries as well advanced toward the eradication of tuberculosis as Canada are Holland, Denmark, and Norway. A study was made of their programmes in operation and the modifications being made because of changing conditions. All three countries have reached a stage comparable with that of Canada and are in a position to provide much useful information helpful in our own control programme. Observations regarding these three countries and other countries are summarized below.

DEATH RATES AND INCIDENCE RATES

Death rates have fallen at about the same rate as in Canada. Denmark and Holland have tuberculosis death rates lower than Canada's and the death rate of Norway is higher. Death rates for tuberculosis in 1959 for these countries as well as England and Wales are as follows:¹

England – Wales	– 8.5
Holland	– 4.0
Norway	– 6.1
Canada	– 5.5

Incidence rates in these countries have fallen much more slowly than death rates, which was also Canada's experience. Similar case-finding methods have been used, including the maintenance of clinics and dispensaries and the use of surveys of special groups and periodic community surveys.

DISPENSARY AND CLINIC SERVICE

It was observed that there is a more uniform pattern of dispensary and clinic service. In Canada, these and other public health services vary from province to province as well as between urban and rural areas. This service is the responsibility of local health authorities staffed with full-time personnel, except in the case of university centres where there is some tendency to use general internists.

¹ Death rates for other world countries are shown in Table 24.

The calibre of these men appeared to be excellent. In such countries, where all medical services are covered by social insurance, there is not the discrepancy between the income of those in tuberculosis services and those in other branches of medicine. There is some variation in the method of remuneration. While many are on salaries on a full-time basis, some have other consultation privileges. Some are employed on a capitation fee and some specialists are paid for services rendered. It appears that the level of remuneration is such that tuberculosis services have been able to compete with other branches of medicine.

The present lack of interest in tuberculosis services in these countries has stemmed from the decline in the importance of care of the disease as a career and most of those asked about this agreed that integration of TB with other chest diseases, and eventually with internal medicine, will take place. All agree, however, that certain key administrators will continue to be full time. There was little enthusiasm in any of the three countries for the proposition that the general practitioners were to assume full supervision of tuberculosis diagnosis and treatment. All, in fact, stressed the need for supervision by dispensaries, staffed with competent consultants and nursing services to ensure an adequate public health supervision and follow-up of the disease even though an increasing involvement of and integration into general medical services will be possible.

CASE REGISTERS

All these countries have developed case registers to a greater extent than have our Canadian provinces. Denmark, through the Danish Tuberculosis Index and the records of the State Serum Institute, is able to provide statistical information on all phases of tuberculosis which can be related to the general population to a greater degree than any other country in the world. Resulting studies will include assessment of vaccination and prophylactic treatment by drugs in population groups such as the Eskimos of Greenland. The final report on the Greenland study may provide us with some useful information on our problem with the Eskimo.

INSTITUTIONAL TREATMENT OF TUBERCULOSIS

Of particular interest was the situation in regard to institutional treatment of tuberculosis and the period of domiciliary treatment with drugs which must follow. In all three countries, the length of treatment has been reduced. Holland is the last to reduce the period of institutional rest, but is carrying it out in a more gradual fashion. Beds not used for tuberculosis have been converted mainly for use for care of chronic illness, geriatrics and mental diseases.

CARE IN GENERAL HOSPITALS

In all these countries the conversion of tuberculosis beds to other uses came about more smoothly than in Canada because the treatment of tuberculosis is financed from the medical insurance fund.

The most radical departure in the use of general hospital wards for tuberculosis has taken place in Norway. There at least half the sanatoria have

been converted for use by mental patients and a building programme has actually been carried out to provide wards in general hospitals for tuberculosis. In Copenhagen a new hospital is being constructed. It will provide tuberculosis beds to replace the present tuberculosis hospital. Its wards can be easily converted to the treatment of other diseases. It will be used for teaching purposes and will lead to much closer integration of tuberculosis and general medicine.

BCG

BCG is still used in all these countries, although there is a tendency to postpone its use to school-leaving age rather than giving it in infancy as formerly, and to concentrate on highly exposed groups, such as contacts, Laplanders and the Eskimos of Greenland.

SPECIAL FEATURES

The most impressive features of the service in these countries were:

- i. The well-organized and -staffed *clinic* service for diagnostic and case finding and supervision of domiciliary treatment and follow-up.
- ii. *The prompt conversion of empty sanatorium beds and provision for general hospital wards for tuberculosis services.* This feature was particularly noted in Norway.

There was no expectation for the early disappearance of tuberculosis. As a clinic director in Holland remarked, "With another ten years, if we carry on our present programme, we may get it down to WHO minimal standards. If we neglect our services, it could take 30 years".

INTEGRATION WITH OTHER MEDICAL SERVICES

It was the general impression that integration will take place gradually and that public health supervision will be required for many years.

TABLE 24
TUBERCULOSIS DEATH RATES PER 100,000 POPULATION

Country	Rate
South Africa	
White population	7.7
Asiatic population	22.2
Coloured population	111.7
Egypt.	23.8
Canada	5.5
Chile	54.6
Colombia.	27.8
Costa Rica.	14.5
El Salvador.	15.2

TABLE 24 (Concl'd)

Country	Rate
United States	
All races.....	6.5
White.....	5.5
Non-white.....	14.4
Guatemala.....	33.1
Panama.....	24.4
Puerto Rico	29.2
Trinidad and Tobago.....	14.2
Venezuela.....	23.8
Hong Kong	76.2
Israel.....	6.1
Japan.....	35.5
Singapore	39.7
Germany	
Federal Republic.....	16.4
West Berlin.....	24.8
Austria	24.1
Belgium.....	17.0
Denmark	4.0
Spain	26.2
Finland.....	28.6
France	23.2
Greece.....	17.9
Hungary.....	32.1
Ireland.....	18.2
Italy.....	18.2
Norway	6.1
Netherlands	3.6
Poland.....	44.8
Portugal	51.1
United Kingdom	
England & Wales.....	8.5
Scotland	11.1
Northern Ireland	10.2
Sweden	7.2
Switzerland.....	15.8
Czechoslovakia.....	29.8
Australia	5.5
New Zealand	
Excl. Maoris.....	4.5
Maoris	25.3

Source: World Health Organization, Annual Epidemiological and Vital Statistics 1959.

CHAPTER 8

SPECIAL PROBLEMS NOT SHARED BY GENERAL MEDICAL SERVICES

FACTORS ASSOCIATED WITH DEVELOPMENT OF RESISTANCE TO DRUGS

Standards of Medical Care

As mentioned in the previous chapter, the development of resistance to drugs usually stems from inadequate drug treatment of the case and failure to take the required drugs for a long enough time.

To offset this, the following conditions are required: the patient must be impressed with the need for a lengthy period of treatment, the attending physician must appreciate the need for judicious use of the drugs available and the need to change them to others should resistance develop, patient at home must assume responsibility for taking the drugs regularly. In practice it has been found that regular attendance at the clinic or doctor's office is necessary; in addition, it bolsters the patient's ability to co-operate in his own treatment. Home visits by attending physicians or public health nurses will be necessary.

Recent studies in Canada¹, and studies in other countries, have shown that continuing treatment on a domiciliary basis is by no means simple. Many patients neglect taking their drugs. Physicians may be too busy to give constant supervision, and clinic staffs, both physicians and nurses, may be insufficient to handle the problem.

There is no denying that this is a serious defect in our treatment programmes. Of the actual cases under treatment in Canada approximately one in five is a reactivation. The rate of reactivation in the ex-patients in the community is about twenty times the rate of new cases of tuberculosis developing in the rest of the population. Only in very few instances is there a service that can assure adequate treatment and follow-up. The solution of this problem should be given first priority.

¹ Allen, E.A., Stewart, M., Jeney, T., *op. cit.*

Problem of Recruitment and Training

It is becoming increasingly difficult to recruit young men for the tuberculosis services. As hospital and sanatorium treatment services are being reduced, medical students and younger doctors conclude that the care of tuberculosis as a career does not hold out a satisfying future. Consequently the work is left with older men and medical men from other countries who have come to Canada and accepted positions in tuberculosis services. In some provinces not more than 25 per cent of the medical staff are Canadian born. Often they are employed on lower salaries than in other fields.

This need not be if two conditions are fulfilled. Positions in tuberculosis services need to be upgraded as to training requirements, salary and superannuation benefits. Remuneration must be comparable to that earned by physicians in private practice and salary schedules should be at the level of specialists and not of the lesser echelons of health department personnel.

It may be advisable to treat tuberculosis in special wards in general hospitals giving internists responsibility both for care and supervision. Physicians so employed will also be trained in the care of other respiratory diseases and in general internal medicine.

In university centres these services should have an established place in the training of the undergraduate students in tuberculosis and other respiratory diseases and in the post-graduate training and research which is still so necessary.

Public Health and Follow-up Services

It is essential that all physicians engaged in the care of tuberculosis patients co-operate with full-time services of the health department through the tuberculosis register. Clinics and laboratory services will need to be available for follow-up supervision.

Only by such co-ordinated services can we expect permanent control of the disease and the prevention of reactivation and the spread of infection.

CHAPTER 9

INDIANS AND ESKIMOS

THE INDIAN

As mentioned earlier in this study, Indians and Eskimos have constituted a special problem in tuberculosis control. There are a number of factors which contribute to this state of affairs. The Indian seems to have lacked the natural resistance of white people. This is deduced from the acute forms of the disease which were prevalent when contact with the white man was first established. It must be remembered, however, that special susceptibility of the Indian to tuberculosis is an assumption rather than an established scientific fact since there are no statistics on the incidence of tuberculosis in an equal number of whites living in comparable conditions as regards housing, nutrition and the availability of medical services.

Canada's Indians lived for the most part in crowded one-room dwellings which provided optimum conditions for the spread of infection through a whole family. Dietary deficiencies were common. Superimposed on these disadvantages was a lack of education which barred them from the common avenues of learning about prevention of disease. Over a long period the Indians were isolated on reserves with little in the way of medical services except of an emergency nature. It was assumed that the Indian would not accept treatment for tuberculosis. Certainly he did not feel at home in the white men's sanatoria.

While some hospitals and medical services were established on reserves (e.g., Six Nations), in general medical officers were appointed on a part-time basis and often on the recommendation of the politicians. Public health nursing services were practically non-existent. What services were available reflected the economy drives of treasury officials. As an example, during the depression of the thirties a directive was sent from head office to Indian agents stating that authorization for hospital treatment was only to be approved when the matter was urgent and it was a case of saving "life, limb or eyesight". Prevention of disease was not taken seriously as government policy for the Indians.

One of the first serious efforts to attack tuberculosis was made in Saskatchewan when the Qu'Appelle Health Unit was formed with a full-time medical service. It was a co-operative effort between the Department of Indian Affairs, the National Research Council and the Saskatchewan Anti-Tuberculosis League. Case-finding and treatment services were attempted. There was regular examination of school children and BCG vaccination was introduced for newborn babies. This was done as a controlled experiment. It was found that the incidence of tuberculosis was reduced by 80 per cent in the children vaccinated in the Qu'Appelle Health Unit as compared to the controls in this controlled experiment.

In 1937 a national conference on tuberculosis among Indians was convened by the Directorate of Indian Affairs and the Canadian Tuberculosis Association. Recommendations were made for a programme of tuberculosis control. A special grant was made to encourage a programme of prevention in Indian schools. From then on there was a marked increase in interest and effort. Following the war, medical services were increased and special hospitals provided, either by new construction or by taking over defence hospitals. The regular X-ray examination of Indian populations was undertaken and tuberculous Indians placed on treatment either in Indian or in provincial hospitals.

In 1944 an Advisory Committee on Indian Tuberculosis was appointed by Order in Council. This committee met in May 1945. It reviewed the plans of the department and approved a number of recommendations. It is of interest that every one of these recommendations has been implemented. The results have been striking. The TB death rate for Indians in 1961 was 20.2 as compared with 579.2 in 1944.

THE ESKIMO

If the Indians have constituted a complicated problem, the Eskimos have presented one even more difficult because they are scattered over the Northwest Territories and the Arctic Islands. Transportation has been difficult. Services of all kinds have been and are costly, they are also hard to organize and to maintain.

The problems of the Northern Health Service of the Department of National Health and Welfare are ably described in "Disease and Death in Canada's North", prepared by John S. Willis, M.D., D.P.H., Northern Health Service, and in the Brief for the Royal Commission on Health Services, "Health in Canada's North", prepared by the Northern Health Service, Department of National Health and Welfare.

Anyone who has seen conditions at first hand in both Western and Eastern Arctic, as a member of the medical staff of the Eastern Arctic Patrol, can vouch for the conditions described by Dr. Willis. The Northern Health Service is perform-

ing a marvellous service which deserves every commendation. The hospitals and nursing stations established there are necessary and must be maintained even though they are expensive. At the same time, the department was certainly right in bringing many long-term patients south for treatment rather than attempting to provide such treatment in the far North.

While much can be done to treat and investigate short-term medical conditions at these northern hospitals, in many instances it is advisable to bring patients south for treatment rather than attempt to organize these costly services in the North. Heretofore, it has been almost impossible to secure specialist services in these northern hospitals. Medical staff tend to serve on a relatively short-term basis. However, every inducement should be offered to retain young, well-trained staff with as much continuity of service as possible. It seems that there are dedicated men and women who would be willing to make this service a career but salary schedules should take the hardships of the service into consideration.

The programme for Eskimos deserves special attention. Medical teams were sent into the Arctic as early as 1946 on supply ships such as the "Nascopie" and later the "C.D. Howe", and some Eskimos were evacuated for treatment. During the 1950's the work of these teams was accelerated. Chest X-ray facilities were introduced and an attempt made to send all Eskimos with active disease south for treatment. The horrifying incidence of tuberculosis can be deduced from the fact that in 1956, 793 Eskimos were under treatment for tuberculosis whereas in 1961, the number admitted for treatment had dropped to 153.

Success in treatment of Eskimos has been outstanding and is a telling argument for those who maintain that unusual susceptibility is not racial but rooted in environmental factors which favor the germ. The Eskimos have responded to the newer drugs as well as the white population, incidence is falling much more slowly than the death rate.

On December 31, 1961, there were still 279 Eskimos in sanatoria, an indication that incidence is still high. It should be added that these patients continue sanatorium treatment longer than is usual, which contributes to the number in sanatorium. The Eskimo patient is returning to rugged conditions where the clinic supervision recommended throughout this study is not possible. He may be thousands of miles from a doctor. For that reason, a physician must be very sure indeed of his patient's recovery before discharging him.

TABLE 25
REGISTERED INDIANS AND ESKIMOS IN TUBERCULOSIS INSTITUTIONS,
CALENDAR YEARS 1953-1961

Year	Registered Indians			Eskimos			Totals		
	Admitted	In at end	Patient days	Admitted	In at end	Patient days	Admitted	In at end	Patient days
1953	n.a.	2,627	965,593	n.a.	348	125,875	2,975	1,091,468	
1954	n.a.	2,380	978,285	n.a.	344	144,185	2,724	1,122,470	
1955	3,343	2,284	879,454	950	698	183,336	4,293	2,982	1,062,790
1956	2,972	1,894	770,842	870	703	231,425	3,842	2,597	1,002,267
1957	1,989	1,602	640,588	583	535	206,551	2,572	2,137	847,139
1958	1,752	1,375	538,129	547	450	186,264	2,299	1,825	724,393
1959	1,685	1,209	465,876	490	345	153,598	2,175	1,554	619,474
1960	1,558	989	410,375	448	295	111,277	2,006	1,284	521,652
1961	1,838	899	366,923	566	279	109,043	2,404	1,178	475,966

Admissions include first admissions, readmissions and transfers.

Source: Compiled by Department of National Health and Welfare, Medical Services, Systems and Statistics Section, Indian and Northern Health Services.

ISOLATION OF INDIAN AND ESKIMO TUBERCULOSIS SERVICES

Because of the acuteness of tuberculosis problems in these groups, and because of their isolation, it was necessary to develop special medical and hospital services for Indians and Eskimos. It has been demonstrated that Indians and Eskimos are more contented to remain on treatment for longer periods when they are with their own people than when mixed with white patients. Usually there is some degree of racial discrimination practised, consciously or unconsciously, where Indians and Eskimos are in the minority as is usually the case when they are mixed with white patients. When staff deal with Indians and Eskimos exclusively, they acquire experience and aptitude in dealing with these people which they rarely obtain otherwise.

For these reasons the department was justified in setting up its own medical services and hospitals rather than depending on the services provided in provincial institutions. For the Northwest Territories, a special service was essential. Great credit is due to the Indian and Northern Medical Services of the Department of National Health and Welfare. A great deal of the progress made is due to the active leadership that has come from that department since the end of the Second World War.

POSSIBILITY OF INTEGRATION

Because of the great progress made, it would appear that the Indian services may be ready for the next phase of the programme, which is being treated like that of any other Canadian. While these advances were being made in medical services for Indians, there has also been considerable progress in their general education. As a result, a gradual change can be seen. Most people now agree that the final solution of the problem is complete integration of services of the Indian and Northern Health Services and those of the provinces, except for the territory north of the provinces. The question is how and when it will be possible to bring about this integration.

The Glassco Commission Report recommends that medical services and hospitals of Indian Medical Services be disbanded or turned over to the provinces to operate. It particularly criticized the plans to continue and expand the hospitals at Sardis, B.C., and the Charles Camsell Hospital at Edmonton, Alberta.

From observation during the years since these institutions were taken over, it appears, however, that these have been as valuable as any in the service. The services they have provided are on a par with any hospital anywhere. The Charles Camsell has been strategically placed as a treatment centre for the northern areas of the western provinces and the Northwest Territories. It has been invaluable as a staff training institution.

While plans for building replacements and extension may be too ambitious in view of the changes taking place in the tuberculosis picture, based on experi-

ence in treating Indians in "white" institutions, there is still need for these centres for years to come. Any attempt to bring about immediate integration with provincial services in these provinces would not be in the best interest of the Indians and Eskimos at this time.

As the patient-load falls in British Columbia it is conceivable that one of the three Indian institutions will become the centre for the tuberculosis care of Indians in the province. The hospital at Sardis is suitable for this purpose. It would have advantages that the general hospital and existing "white" sanatoria situated in the centre of Vancouver do not possess.

The Charles Camsell hospital in Edmonton has been ideally situated as a centre for Indian and Eskimo care for northern Alberta and the Northwest Territories. It does not appear that such a useful or practical centre can be established on the university centre and much less in other centres in the province.

One may have grave doubts as to the wisdom of developing long-term treatment centres in the North to a greater extent than at present. The difficulties of obtaining the necessary trained staff on a long-term basis are not likely to lessen. Costs will continue to be a major handicap.

The question of cost in provincial institutions as compared to those of the Indian and Northern Health Service hospitals is important. It is essential that more information on costs be available for federal institutions. Those for the sanatoria in Alberta and British Columbia are the highest in Canada being \$17.92 and \$17.70 respectively for 1961 as compared to the average of \$12.20 for Canada. It is questionable if costs for Sardis and the Charles Camsell hospital estimated on a comparable basis are as great.

This is not to say that integration is not working well where it has been given a fair trial. Public health nursing services provide one example. Clinics and hospital services can also be integrated successfully as in Manitoba. More and more hospital services are being integrated.

Efforts to integrate the service vary from region to region. Geography plays an important role. It is much easier to integrate a service when Indians and Whites live in the same area than it is when the Indians or Eskimos are isolated by distance from the main body of the Canadian population. It would appear that for some time to come the Indian Medical Services need their own medical centres for such areas as northern British Columbia, Alberta, and the Northwest Territories.

It would appear also that if the provinces are to assume these responsibilities in the future, a definite arrangement will have to be worked out whereby the Indian and the Eskimo will receive similar care to that which he is receiving in departmental hospitals and which the white population received in provincial institutions. It seems evident that there has been a tendency to place the Indians in wards which are not as attractive or desirable as those used for white patients. Too often they have been treated in white institutions as indigent patients rather than as Canadian citizens.

If the service is to be integrated it will be necessary to increase the provincial staff of clinics, and in some cases hospitals, to handle the increased work load. If and when the changeover comes, it would seem sensible to recruit additional staff from those already employed by the Division of Indian and Northern Health Services, Department of National Health and Welfare. These employees are accustomed to Indian patients and understand their point of view better than most new workers could. Their experience in the field is probably as useful as a course of sociology and it would be wasteful not to take advantage of it.

There will, in all probability, be difficulties in adjusting salary and superannuation schedules but they are by no means insurmountable. Also, when the matter of employing physicians on a fee-for-service basis is considered, one would want assurance that such appointments would not be subject to political influence. Such appointments should be made solely on professional competence and medical qualifications.

Although the majority of people with knowledge of the Indian and Eskimo problem would subscribe to the proposition that integration of services holds the greatest promise for the future, unless positive action is taken there is not likely to be much progress made in this direction.

The suggestion is here made that a full-time officer be delegated to develop a 10-year programme of integration. He would have authority to visit the provinces and discuss ways and means of implementing the programme to integrate services. Consideration should be given to the setting up of a committee to assist him. The committee would be made up of representatives of the provinces and of the federal departments involved. The officer and committee would be responsible to the Minister of National Health and Welfare.

It is idle, of course, to talk of full integration of medical and tuberculosis services to Indians and Eskimos apart from integration in Canadian life in general, and it is unrealistic to evade the fact that integration is bound up with the economic status of these people. To that extent tuberculosis among the Indians and Eskimos is as much a social as a medical problem. Fifty years ago Sir William Osler told his medical students that tuberculosis was a social problem with a medical aspect. Time has proved Dr. Osler right. It is time we applied his thinking to the solution of the tuberculosis problem in our native population.

Obstacles to integration might be reduced if services to the Indians and Eskimos were consolidated as much as possible. Consideration should be given as to whether closer co-ordination could be brought about between the Indian Affairs Branch and the Department of National Health and Welfare. This would make feasible a combined approach to all health and welfare problems of Indian and Eskimo Canadians.

THE FUTURE OF THE INDIAN AND NORTHERN HEALTH SERVICES

The development of these services from the skeleton emergency organization that existed prior to World War II is a saga in the health story of our

native races. The building up of these services required initiative and imagination that has been shown in great measure by the personnel. That this has been possible indicates a dedication and an interest in the Indian and Eskimo which has received the support of the Minister of National Health and Welfare and the Treasury officials of the government of the day.

The future of these services will be a matter of consolidation. Gaps must be filled in and areas of overlapping, particularly with the provinces, eliminated. Quality of medical and public health services must be considered. Appointments to the service should be to those having training, clinical knowledge and ability. Salary schedules should be adjusted to attract personnel of such qualifications. This agrees with the findings of the Glassco Report that the quality of the medical staff should be raised and present members encouraged to continue training.

One has the feeling that the complement of medical staff is reasonably adequate. What is required is continuity of qualified men who will develop the integrated programme now required. On the other hand, the provinces will need to assume a much greater responsibility as to service and finances if the integration programme which they have advocated is to serve the Indian and Eskimo better than the one at present.

The provinces have advocated integration of medical services. If such a policy is to succeed they must assume greater responsibility. This means they must contribute financially so as to provide the same services as are available to other Canadians. The provinces should not expect integration to mean that they will operate the services on a blank cheque from the federal government. Medical services are not provided for any other Canadian ethnic group at federal expense so why should it be expected that the central government finance this group entirely?

POST-GRADUATE MEDICAL TRAINING

Special attention should be given by the department to the programme for post-graduate medical training. More encouragement should be given in the matter of leave with pay and subsequent salary increases to encourage additional training in clinical medicine. It is evident that greater emphasis has been placed on the acquiring of a DPH diploma than on extra training in clinical subjects. There is obviously a dearth of well trained medical officers as compared with those with public health training. The role of medical officers is that of a clinician as well as that of a public health officer. This applies to Indian and northern services more than to provincial health officers.

A PROGRAMME TO DEAL WITH LOCAL EPIDEMICS

While this study was being written, information on a local epidemic of tuberculosis at Eskimo Point was being investigated by the department. There has been a sudden increase in cases of active tuberculosis at this settlement. During

recent months there have been acute epidemics of measles, virus infections and influenza. This has provided fertile soil for the tubercle bacillus. The tuberculosis infection apparently came from a number of infectious cases present in the settlement. The occurrence of such outbreaks serves as a warning of the necessity for vigilance in the health supervision of these northern posts.

CHAPTER 10

RESEARCH

Continuous research is absolutely necessary if we expect to eradicate tuberculosis. Both basic scientific research and social research should be regarded as essential activities to be maintained steadily, not sporadically. Basic research is required if more and better drugs are to be found. The continual search for a better drug is one which no country such as Canada should evade. It entails more basic research than we have so far attempted. We cannot always expect to depend for our answers on research carried out in Britain and the United States.

Until there is a better drug, one more effective and quicker acting, all countries, and particularly the underdeveloped ones, will wait a long time for eradication of tuberculosis. More funds for this purpose should be available from the National Research Council and federal grants for research. Every encouragement should also be given to voluntary efforts in this direction. The imagination of the public has been caught by the possibilities of research and many voluntary associations are prepared to give financial support. The same can be said for attempts to discover a better vaccine than that at present in use. While a great deal of necessary work, often regrettably negative as to results, has been carried out, recent developments in biochemistry have opened up hopeful fields and we should be playing our full part in this matter.

Social research is also tremendously important in tuberculosis. The ways in which the disease spreads, the resistance of population to infection and the effectiveness of treatment are all affected by environmental and cultural factors. We still have much study to do in the assessment of social factors. This, too, is a field in which voluntary funds can make a valuable contribution. An example which might be cited is the study of the Metis population of northern Alberta by the Department of Sociology of the University of Alberta, a study which was financed by the Alberta Tuberculosis Association.

Another type of research which is not centred in the laboratory but is of great importance to progress toward eradication is the continuous review of each phase of a programme. Once machinery has been set up, it is all too easy to follow an established pattern even though the conditions it was designed to meet have changed radically. Case-finding is a case in point. The extent to which tuber-

culin testing and mass chest X-ray surveys are used will almost certainly change because, if they are effective, they will before many years become unproductive and could be either curtailed or abandoned.

Another area of research could analyse the special problems of Indians and Eskimos. There is no research programme, as such, in this connection. There are a number of subjects for investigation. Some of these are:—

- (1) The extremely high morbidity and mortality from respiratory diseases, particularly pneumonia, with resultant fibrosis, bronchitis, bronchiectasis and emphysema.
- (2) The high incidence of tuberculosis.
- (3) The apparent low incidence of cancer, especially cancer of the lung.
- (4) The relatively low incidence of cardiovascular diseases.

CHAPTER 11

THE PLACE OF BCG IN THE PROGRAMME

The role of prophylactic vaccination in tuberculosis has been somewhat different than that in some of the other communicable diseases, notably smallpox and diphtheria.

After much research two French scientists, Drs. Calmette and Guerin, in 1925 produced a vaccine which appeared to provide protection against tuberculosis. It was developed from a bovine strain of tubercle bacilli which had been cultured on a special medium until it had become so attenuated that it did not produce clinical tuberculosis but did confer some degree of immunity. After considerable work with animals they believed that it was stable and advised its use in man.

Since that time a great deal of work has been done. There has been a marked difference of opinion as to its value. Many careful studies by competent observers have been carried out. The majority agree that the vaccine is harmless and confers an immunity of approximately 80 per cent. Two important studies have been carried out in Canada, one by Dr. R.G. Ferguson among Indian babies in the Qu'Appelle Valley, and another by Dr. J.A. Baudoin in Montreal among children in contact families.

By far the largest test was that conducted by the British Research Council of 50,000 "school leavers". It was found that the incidence of tuberculosis was approximately one in the vaccinated to five in the control group. The results of this controlled study have been accepted generally.

The objections to BCG have had to do mainly with difficulties in its preparation and administration. It is affected by heat and light. Some strains have become so attenuated that they have lost their immunological qualities. The most important objection is that the value of the tuberculin test is lost in the vaccinated person. Those who have been successfully vaccinated become "tuberculin positive" so the value of the test as a diagnostic procedure is lost. Other objections are that a vaccination programme requires considerable staff to carry out preliminary tests, administer the vaccine, and do a post-vaccination test and revaccinate if the subject again becomes negative. Possibly a certain amount of complacency in the face of declining tuberculosis death rates is behind this attitude.

Present policy is to recommend that the vaccine be used in certain population groups exposed to a high risk. These are contacts of known cases, nurses in training and medical students, Indians and Eskimos and inhabitants of certain high incidence areas. An efficient vaccine would be of particular advantage at this stage of the campaign. We are already observing some local outbreaks of tuberculosis in tuberculin negative groups. A vaccination programme would prevent this.

There is some evidence that it is possible, theoretically at least, to develop a vaccine which would confer immunity without using a live vaccine. A limited amount of research work is going on in the United States on this point. A plea is made for more interest and more funds to assist this type of basic research. Such a vaccine, while desirable here in Canada, is more necessary in other parts of the world where the disease is still a major threat.

CHAPTER 12

THE PLACE OF THE VOLUNTARY ASSOCIATION

As mentioned in this study, historically the provincial and local tuberculosis associations accepted financial responsibility for the building of sanatoria and the organizing and financing of clinics and nursing services. As official agencies began to assume responsibility, the voluntary associations were enlarged to include many functions connected with case finding (surveys, etc.), education both lay and professional, rehabilitation and a limited amount of social work. These will remain the basic functions of the voluntary association.

In recent years the associations have interested themselves in two additional projects. The first is research. All provincial tuberculosis associations are contributing to a central fund and some provincial associations have research programmes of their own. The other interest is in tuberculosis in the world at large. This would appear to be a very desirable function. The national association has a role to play in connection with the International Union Against Tuberculosis, parallel to the role played by our national government in relation to WHO.

A special role is played by some of the voluntary associations. This is the administration and direction of many institutions and several major tuberculosis clinics and dispensaries. These have remained under voluntary management although the funds come mainly by way of government grants. There is evidence to show that these have operated at lower costs than institutions operated by government agencies. They have, however, in some instances, done so by maintaining salary schedules and superannuation rates below the level of either government agencies or private practice.

CHAPTER 13

SUMMARY

1. Tuberculosis is still a serious health problem. Although deaths are few, the number of new cases remains high. Certain age and ethnic groups have a higher incidence than normal. Reactivations are high and a constant source of infection to others.
2. Adequate facilities for diagnosis, treatment and after-care are essential. Adequate supervision by health departments is necessary. The maintenance of case registers is a basic requirement for the direction and planning of all services.
3. There is difficulty in maintaining competent medical staff for tuberculosis services. Tuberculosis work today does not attract young, well-trained medical personnel. Salaries are not sufficient to compete with other branches of medicine. It may be advisable to treat tuberculosis in special wards in general hospitals giving internists responsibility both for care and supervision. Physicians so employed will also be trained in the care of other respiratory diseases and in general internal medicine. In university centres these services should have an established place in the training of the undergraduate students in tuberculosis and other respiratory diseases and in the post-graduate training and research which is still so necessary.
4. Treatment costs remain high in spite of shortening of hospital stay and reduction in hospital days. There has been a steady increase in institutional costs. Overhead is high because of increased number of unoccupied beds.
5. Federal Health Grants for tuberculosis have played an important role in improving standards and services for tuberculosis control. As the importance of institutional care lessens, they should be diverted to the maintenance of community medical and auxiliary services for diagnosis, treatment and after-care of tuberculosis.
6. Tuberculosis should be included in federal-provincial hospitalization plans. Every effort should be made to eliminate obsolete, redundant and unoccupied sanatorium beds.
7. Some tuberculosis services might be integrated with general medical services including the treatment of tuberculosis in general hospitals.

8. Indian and Northern Medical Services must continue supervision of the Indian and Eskimo problems, but a gradual programme of integration for southern Indians should be undertaken.
9. A continuous research programme is essential to evaluate and approve present treatment methods and drugs presently in use. Every effort must be made to discover or develop a more adequate vaccine and quicker acting drugs if tuberculosis is to be eradicated in Canada within a generation.
10. Voluntary boards and associations have played a useful role in pioneering, developing and providing tuberculosis control services. They still have a useful role in operating many institutions and services even though the cost of such services may have been assumed by official agencies. Such voluntary direction can lead to greater economy in operation.

CONCLUSIONS

1. The importance of tuberculosis as a serious residual problem should be recognized by provincial and federal health authorities.
2. Community services need to be maintained on a high level for diagnosis, treatment, after-care, and prevention of this disease. Efforts should be made to upgrade these services as to training, and remuneration should be made accordingly.
3. Public health departments should continue the supervision of tuberculosis. To this end case registers should be maintained in all provinces to provide information as to the prevalence of the disease at all times.
4. Tuberculosis services should be integrated into community and general medical services where possible with continuing over-all supervision by health departments of this recognized infectious disease.
5. Tuberculosis should be included in the plan for hospital services with the Federal Government participation to the same extent as for other diseases.
6. Health grants for tuberculosis should be made statutory and on a population basis and be used mainly for community services for diagnosis, out-treatment and follow-up. The amount of such grant should be fixed at \$4,000,000 subject to review in five years.
7. Special attention should be given to racial groups where tuberculosis is still a major disease, e.g., Indians and Eskimos. Indian and Northern Health Services of the Department of National Health and Welfare should continue the vigorous programme of tuberculosis control with gradual integration where possible with provincial services. While maintaining strategic centres for the direction and care of northern territories a long range plan for integration should be studied and put into operation immediately. Medical staff should be upgraded as to post-graduate training. A post-graduate training in clinical work should be stressed as well as the present public health training opportunities.
8. A research programme should be encouraged with financial assistance from national and voluntary services.

9. The necessity of voluntary effort is recognized for the education of the public for the prevention and care of tuberculosis. It is the function of voluntary associations to stimulate interest in undergraduate and post-graduate medical education and research efforts, toward the discovery of a more adequate vaccine or a more effective drug than we have at present for the eradication of tuberculosis.

